A TAXONOMIC STUDY OF SILENE AND RELATED GENERA.

A REVISION OF THE ORIENTAL SPECIES OF SILENE.

by

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INTRODUCTION

The first general study of the Oriental species of Silene was published by Boissier in his " Flora Orientalis " vol. 1 in 1867.Boissier recorded 206 species from the Oriental countries,including Greece and the Caucasus.In 1868 the first comprehensive systematic treatment of the genus was published by Paul Rohrbach in the form of a monograph.F.N.Williams revised the genus in 1896,but his treatment of 390 species of Silene was for the most part a transcription of the earlier work of Rohrbach. Since 1896 the number of species published has nearly doubled.With this great increase since the last treatment of the genus,it is evident that a new taxonomic revision of Silene is desirable.

The present revision of Silene covers only Turkey and some of the neighbouring countries of the Orient.Although it would be better to have included the Caucasian species which play an important part in the formation of the Turkish and Iranian flora,the complexity of the taxonomic problems connected with a study of the plants from the region South of Caucasus would have necessitated additional time and facilities that were not available.

The present work cannot be claimed to be final; Silene is too complex for that.However,as much data and experience as it has been possible to assemble over a period of two years has been directed towards a solution of this problem.Some of the species are inadequately known because

their native regions have not been botanically explored;others should be studied cytologically to elucidate certain problems concerning them.Still others should be studied in cultivation in order to test their presumed plasticity.These methods of approach are beyond the scope of the present undertaking

In my attempt to circumscribe the limits of allied genera of Lychnideae I have recognized Agrostemma,Lychnis, Petrocoptis,Heliosperma,Silene and Cucubalus as natural entities. Melandrium of Rohling has been divided into two groups,of which one with 2/3 of the species has been sunk in Silene,and the second group retained as a separate and distinct genus under the generic name Wahlbergella

While in the treatment of the genus Silene I have not recognized the 3 subgenera which were proposed by Paul Rohrbach and Pax & Hofmann ,I have divided the genus into 42 sections.The diagnoses of the sections,along with their subsections,both old and new,are given with a list of species under them.This list contains only those species which I have examined at the Herbarium of Edinburgh,so the list does not claim to be complete.Each section has been briefly described and a key to the Oriental species has been added for those which have been examined.

In all,149 species have been studied from the Oriental countries,but nearly 50 species (including recently described Russian species) have been left out as these were not represented in the herbaria at Kew,British Museum or Edinburgh. Out of these 149 species enumerated 11 species are described for the first time.In addition to these 11 species, 2 subspecies and 5 varieties have been newly described.

HISTORY

The genus Silene was defined by Linnaeus in the Systema Naturae,ed.1,(1735) and Genera Plantarum,ed.1,132 (1737) no.372,and established in Species Plantarum,ed.1,416 (1753),and Genera Plantarum,ed.5,193 (1754) with a brief description which appears in its original form on page 57 of the present work.In the first edition of the Species Plantarum Linnaeus included 27 species under Silene ,of which S.noctiflora Linn. and S.virginica Linn.are still of ambiguous generic position.Linnaeus also described and established another genus, Cucubalus, in the first edition of the Species Plantarum (page 414-416) where he disposed 12 species with very much inflated calyces;since then, Cucubalus has been restricted to one species, C.bacciferus Linn.,in which the fruit is few seeded and berry-like.Out of the remaining 11 species,10 are now recognized as good species under Silene ;the 11th one,C.quadrifidus (which Linnaeus himself transferred to Silene in the Systema Naturae, ed.10,1032,1759),was separated by Reichenbach and a new genus, Heliosperma, was proposed for it on the character of seed and ovary.

In 1763 Adanson published his " Familles des Plantes ", ii,254.He split the genus Silene, and proposed 5 genera on secondary characters.These genera are -Silene ,Atocion,Oberna, Otites and Kaleria .Rafinesque followed Adanson,but went still further in carving out more genera from Silene .In his "Autikon

Botanikon" he recognized Silene ,Atocion, Otites and Oberna of Adanson and proposed 4 more new genera- Pleconax, Xamilenis, Evactoma and Ebraxis. But taxonomists of the recent time have not recognized these segregate genera .

Adolf Otth revised the entire genus in De Candolle's Prodromus (i,367,I824).His work was more or less superficial, and may be said to be a catalogue of the then known forms rather than a monograph in the proper sense of the word. A glance at the list of species which Otth enumerated in the Prodromus will reveal that the same species sometimes appears in different sections or even in the same section under different nomenclatural forms. In the enumeration there are 2I7 species distributed in 8 sections; out of these,nearly half were accepted by Paul Rohrbach as good species, and the rest were either reduced to synonyms or transferred to other genera. The sections in which Otth grouped the species are characterized by such indefinite characters that it is not worth while to persue his classification .

Godron in his "Observations critiques sur l'inflorescence du genere Silene" (I847) enlarged the limit of the genus Silene by including the subgenus Elisanthe Fenzl of Melandrium and the species belonging to Heliosperma. He absorbed the little anomalous groups within the large genus Silene with which they show strong affinities, and this same view of the limit of the genus Silene was taken by Bentham and Hooker in their " Genera Plantarum",i, I47 (I862-67).

In I867 Boissier reviewed about 2I6 species from the Oriental Countries in his " Flora Orientalis",i,567-657,and put forward a provisional scheme of classification.He disposed the

species under 3I sections.Most of these sections can claim to be more or less natural though they are not always well defined. Following Godron and Bentham & Hooker, Boissier included the genus Heliosperma and some species of Melandrium in Silene.

One year later there appeared a monograph on Silene by Paul Rohrbach under the title "Monographie der Gattung Silene" which remains uptil now the most outstanding contribution to the taxonomy of the genus.While admitting that the seed character has got generic value,he discarded the idea that species with a variable number of carpels should be separated from the related species ,i.e.,he did not consider the number of carpels to be the cardinal character in establishing separate genera .He,therefore, included Eudianthe Reichb. in Silene. Rohrbach proposed two subgenera under Silene and these subgenera were divided into sections and series; these series were largely based on those of Boissier.

In I896, a revision of the genus Silene was published by an enthusiastic Caryophyllologist,F.N.Williams,in the Journal of the Linnean Society (vol.xxxii,I-I96). His work is largely based on the Rohrbach's contribution,except that he included all the species described after Rohrbach's monograph.Williams followed Pax and Hoffmann in accepting three subgenera in his revision,but he proposed a new name, Gastrosilene (following Fenzl's Gastrolychnis) for the somewhat misleading name, Behen, one of Rohrbach's two subgenera.He excluded from Silene all the species with 5 carpels, and species with capsules unilocular at the base, but he did not propose any other change in the Rohrbach's classification.Williams cited few specimens and his

work lacks the precision and insight of Rohrbach's .Since the appearance of this work,over 230 additional species have been proposed,so that again a further review of the genus is essential. Such an undertaking is beyond the scope of the present effort,which is directed towards an elucidation of the Oriental species only.

SUBGENERIC DISCUSSION

As already stated in the historical review, the earlier taxonomists were satisfied in disposing the species of *Silene* under sections which are delimited by weak characters. Boissier in his Flora Orientalis (vol.i) revised the species of *Silene* from the Oriental Countries and divided the genus into 31 sections. These sections are to some extent natural, though the diagnoses of the sections were not satisfactory. It was for the first time that Paul Rohrbach, with a view to achieve a natural classification, divided the genus into two subgenera- *Behen* and *Silene*. Later on, Pax & Hoffmann (in Engler and Prantl's "Die Natürlichen Pflanzenfamilien ") slightly modified Rohrbach's classification by raising *Conosilene*, one of the subdivisions of the subgenus *Silene*, to the level of subgenus. F.N.Williams made no substantial change to the modified classification, except for changing the name *Behen* to *Gastrosilene*, and transferring a few species from *Behen* to *Silene* on a few technical points.

The subgenera recognized by Rohrbach, Pax & Hoffmann and Williams have not been recognized in this treatment. When the morphological characters used in the delimitation of such ranks are considered, it becomes apparent that these divisions are artificial. This conclusion of mine is further strengthened by the views expressed by two well-known American taxonomists, Hitchcock and Maguire, in their attempt to subdivide the American representatives of *Silene* into subgeneric categories.

The morphological characters chosen by Rohrbach in the delimitation of the subgenera are the structure of the calyx and the aestivation of the petals.Rohrbach characterized the two subgenera as follows:

"Aestivatio petalorum imbricativa.Calyx fere semper ampliatus, I0-vel 20-nervius,nervis reticuloso-venosis raro tantum superne bifurcatim coniunctis.Species perennes."

subgenus Behen

"Aestivatio petalorum alternatim contorta.Calyx aut I0-nervius, evenius vel nervis anastomosantibus,aut 20-30-vel 60-nervius,nervis haud anastomosantibus."

subgenus Silene

It is clear from the above that the aestivation of the petals is the leading character.But the aestivation of the petals in the species of the two subgenera is not constant. I have observed in garden material of S. Cucubalus Wib. that this imbricate aestivation often breaks down,and the same is the case with a few species (S.conoidea Linn.) of the other subgenus. Williams did not consider this character as an important one, and in support of his conclusion he quoted a letter written to him by Sereno Watson in which the latter says "I have never considered the characters that you mentioned of any special importance,and have paid them no attention.If S.Douglasii and S.nivea are to be separated from our other species on the imbrication of the petals,it is evident that the division is not a natural one."

The structure of calyx was taken by Williams as the cardinal character for the limitation of the two subgenera.But

this character also can not be relied upon,as it varies within the limit of the species.Even the inflation of the calyx at anthesis can not be considered as constant in all cases.Researches on S.Cucubalus Wib. and S.maritima With. have shown that in the polymorphic species,S.Cucubalus Wib.,the inflation of the calyx is not always seen. In some plants the calyx is fully inflated at anthesis,while in others it is either semi-inflated or not at all. This shows the unreliability of the character.Moreover,by this character closely related species become widely separated. S.ampullata Boiss. has been separated from the related species of the section Spergulifoliae, and has been placed in the subgenus Behen,while the other species remain in the subgenus Silene.In habit and in floral characters S.ampullata Boiss. and S.armeniaca Rohrb. come very close to one another,except that in S.ampullata Boiss. the capsule has undergone futher modification in having I-3 seeds and in being indehiscent,and the fruiting calyx has become more inflated to provide a means for the dispersal of the capsule. Apart from this,there are many species included in the subgenus Silene where the calyx is more or less inflated at,or after anthesis.Moreover,there being no definite scale for measuring such inflation of the calyx,the position of a species depends on the value given to this character by the different taxonomists. It is for this reason that the species S.Douglasii Hook., S.turgida MB. and S.pygmaea Adams which were kept in Behen by Rohrbach,were transferred by Williams to the subgenus Silene, where the calyx is supposed to be not inflated.This,I hope,is sufficient to prove the unreliability of this character.

The nature and number of nerves in the calyx are difficult to ascertain.The lateral nerves of the adjoining calyx segments become fused in pairs at the base and assume a commissural nature;so that the basic number of nerves in the calyx is I0.But due to the branching of commissural or median nerves,the number often varies from I0-20,20-30 or60. In some species the calyx is I0-nerved, in few species the number of nerves varies between I0-20,while in the species of Conosilene the number of nerves varies between 20-30 or it is 60.In species with greater number of nerves there is a range within which the number of nerves varies.

In Conosilene, the number of nerves,which varies from 20 to 30 or 60, must have arisen from the basic number by branching or bifurcation of nerves near or at the base of the calyx.These nerves are more or less prominent and parallel,atleast in the lower portion of the calyx.This number of nerves is high in comparison to the size and surface of the calyx,and they can serve the tissues efficiently; they are therefore, more or less simple. Even then the commissural nerves bifurcate below the sinuous of the calyx teeth and the branches become fused with other nerves of the calyx segments.In a few species like S.conica Linn. and S.subconica Friv. it is often found that the parallel nerves of each calyx segment emit lateral veinlets which become more or less anastomosed,especially in the teeth.This shows that the nerves normally do not branch,as they can better serve the calyx in that way. Moreover,there are some species in the subgenus Silene where the nerves are prominent,either simple throught or sparingly branched at the apices. With these considerations probably in mind,Rohrbach retained Conosilene within the

subgenus Silene.Following Rohrbach,I have treated Conosilene as a section.

Considering these matters,I have recognized no subgenera or unnatural divisions.The present arrangement of the species under the sections is considered to be natural and convenient.As far as possible I have tried to make these sections homogeneous, but there are still a few sections, containing large number of species, which are more or less heterogeneous; in these the relationship of the species, as well as their relationship with species of other sections is still somewhat obscure.However, with the available data and experience, this arrangement seems to be the best that can be proposed.

SUBSPECIFIC DISCUSSION

Silene, like most other large genera,has produced some monomorphic species and others that are large,loosely defined and polymorphic.The monomorphic species are usually of limited geographical range,and are without marked ecological variants. On the other hand,the large species of wide distribution have developed dissimilar populations,or other entities of a geographical or ecological nature.Geographical variants have been considered as more significant and have been recognized as subspecies.Other entities,which are often less distinctive and more sporadic in occurrance,have been treated as varieties.The variety may extend coincidently with the species or in some cases may tend to be localized within the specific or subspecific range.The delimitation of minor variants has not been attempted.

CRITERIA OF CLASSIFICATION

The characters which have been considered as useful for delimiting sections, subsections and species are discussed below. As the time at my disposal was limited,I have not been able to observe living specimens in the wild state,so my findings are largely based on field records and herbarium material.A few species, however, have been examined in cultivation.

It will not be out of place to mention that no single character, although it may appear as fundamental or very important, can be solely relied onto indicate relationship between species or two separate interrelated groups.One group is likely to have a similar interplay of characters to that found in another group. An example will better illustrate the point- S.Boissieri J.Gay and S.psammitis Lk. whose close relationship to each other is obvious. But the inflorescence in S.Boissieri J.Gay is usually a dichasium, often passing into a monochasium above, but that of S.psammitis Lk. is usually a monochasium.Taking this character as a criterion,it is difficult to put the two species in the same group,but when the characters of pedicels, calyx and corolla are considered together, the relationship between them is apparent. Many similar instances in related and unrelated groups or species can be pointed out.This makes it quite clear that a natural classification of the species of Silene must rest on a series of characters whose pattern has to be carefully determined.

But before starting with the morphological characters, I think it is worth while to discuss the duration and habit of the plants belonging to the different groups.

HABIT AND DURATION OF THE LIFE OF PLANTS

The habit and duration of life of the individual plants belonging to this genus are more or less constant. About 2/3 of the species are either herbaceous or woody perennials, some of them with a suffruticose base and a few caespitose in habit. Plants belonging to the sections Odontopetalae and Brachypodae have a thick, stout, woody and more or less branched caudex which ends in a leafy crown. The caudex gives rise to the flowering shoots at the favourable period. In section Macranthae subsection Pulvinatae the caudex is more or less slender, much branched and compact forming a cushion-like base from which subscapiform shoots arise in the vegetative season. If we class these sections and subsections according to Raunkiaer they will come under woody chamaephytes and cushion type of chamaephytes

The species belonging to the section Caespitosae have a slender, branched and more or less prostrate, leafy caudex which bears the flowering shoots; these plants have a caespitose habit. The sections Inflatae, Holopetalae, Tataricae and subsection Chlorifoliae of section Sclerocalycinae contain plants which have leafy stems. The caudical and lower cauline leaves are usually small and other cauline leaves numerous and conspicuous. These perennial plants come under Raunkiaer's protohemicryptophytes or chamaephytes,

whereas the plants belonging to sections like Paniculatae, Otiteae, Chloranthae, Brachyanthae and subsection Longiflorae of the section Sclerocalycinae still have leafy stems, but the caudical and lower cauline leaves are larger than the upper cauline leaves; so they must be classified as semi-rosette hemicryptophytes. In subsections Scapiformae and Masmenae the floweing stems are scapiform with few pairs of bract-like leaves.

Of the rest, a few species are biennials, but they are variable as regards the duration of life. S.compacta Fisch. is usually a biennial species but sometimes behaves as a short-lived perennial. The rest are annual . Two normally annual species show certain variation as regards the duration. They are S.dichotoma Ehrh. and S.linearis Decaisne. I have seen a few specimens belonging to these species on which the accompanying label states that these plants are perennial . The caudices of these plants are hard and woody, so these two species seem to be variable with respect to the duration of life.

The annual species have probably been derived from the perennial ones, in course of their migration and adaptation to xerophytic and semi-xerophytic conditions

MORPHOLOGIC CRITERIA

Caudex:- The morphological term "caudex" is applied to the part of the plant which is intermediate between root and flowering stem. In perennial species, the caudex is long-lived and at the beginning of the favourable season develops leaves.

In certain sections the caudex is well developed and is usually stout,thick, more or less erect and branched;these caudex-branches generally bear the marcescent leaf bases of the present year in the young portion,and leaf scars on the comparatively older portion.This affords a good diagnostic character for a few sections like Odontopetalae, Brachypodae and Cordifoliae.In other sections the caudex,though woody,is usually slender, branched,ascending and prostrate

In annual species the caudex is short,not strongly woody, simple or more or less branched,and bears the leaves of the current season's growth preceding the development of the flowering stem.

Stem:- In most species of Silene the stem is erect or semi-erect,in some decumbent or more or less prostrate.It is generally solid and terete,only in few species slightly angular,rarely fistular.The nodes which are crowded at the base are often some what swollen.

Certain species show a marked constancy in possessing simple stems while others constantly possess branched stems.In such species,the branching is usually dichotomous,but due to unequal development the branch system apparently seems to be lateral.In some species the branching is truly lateral being disposed racemosely.The branches may develop from the base, from the middle part,or from the upper portion or may develop from all parts of the stem,and this effects the symmetry of the plant.In certain sections and species the stem is scapiform bearing a few pairs of bract-like leaves with one to few

flowers at the top.The type and position of branching and the nature of stem are sometimes of importance in distinguising sections and species;but these features are usually subject to variation,so must be used with caution.In the annual species the plants usually develop several slender stems.

Leaves:- The leaves are simple,entire and usually thin. In some semi-desert species they become more or less fleshy. The lamina is usually flat and provided with a midrib,but in Conosilene it is provided with 3-5 or 7 nerves at the bas e; these provide data for the speciation.The midrib,by its nature and position,usually determines the character of the lamina.In species like S.Cucubalus Wibel ,S.Behen Linn. etc. ,the midrib is relatively slender and the lamina is flat; whereas in section Pinifoliae the midrib is relatively thick and large and the lamina is canaliculate; the latter is triquetrous,filiform and the apex is hard and usually pointed. This is probably a modification in response to a xeric environment.In species like S.Kotschyi Boiss. the midrib is moderately large and the lamina is plicate

Two sorts of leaves are found in Silene.Those of the flowering stems are different from those on the caudex. The leaves on the caudex have been termed " caudical leaves" and have been used throughout this paper.Caudical leaves usually develop at the beginning of the vegetative season, and are crowded forming a rosette at the base of flowering stems.The term "cauline leaves" is restricted to the leaves borne on the flowering shoot.

The caudical leaves are usually large and petiolate. The bases of these leaves are lined by a membranous margin.The expanded bases of opposite leaves become united,forming a sheath round the stem.These bases vary in durability;in most species they are marcescent,while in others they are more or less ephemeral.

The cauline leaves are usually sessile and some what reduced,but in certain sections Holopetalae,Tataricae and Rigidulae they are conspicuous and numerous.In these sections the cauline leaves bear sterile,densely leafy shoots. The leaves of these sterile shoots give the appearance of fasciculate leaves on the main axis.This sort of fasciculation of leaves provides a good diagnostic character.In some species, as S.Czerei Baumg.,S.Cucubalus var. commutata (Guss.)Rohrb. and species of the section Compactae, the middle cauline leaves are more or less amplexicaul and the base is often auriculate.

The size and shape of the leaves are variable within the limit of the species.In the past taxonomists recognized the leaf shape as an important character in the classification and delimitation of species in Silene.Those previous workers have often been misled by the extreme variability of the foliage leaves;in due course additional material has come to hand that has linked together certain species previously considered as quite distinct.Among the subspecies and varieties this was of general occurrence.Strict adherence to this character has often led to ambiguity.To illustrate the unreliability of leaf form I should like to mention a few species.The differentiation of S.chlorifolia Sm.(in which the leaves show variety of

of shapes) from S.swertiifolia Boiss. becomes very difficult as there are intermediate forms both in S.chlorifolia Sm. and S.swertiifolia Boiss.; thus the specific limits are transgressed. This makes the separation into 2 species somewhat difficult. Similarly in S.Cucubalus Wibel,S.saxifraga Linn. and S.colorata Poir.,one would be tempted or inclined to characterized such fluctuations of leaf character as varieties,if not independent species,but careful examination,analysis and statistical data obtained from material collected from the different localities prove the instability of such species,subspecies or even varieties.The characteristic floral structure of these species provides definite proof that they are simply variations of the same species.So,in polymorphic species,it is not wise to put much confidence in leaf form,as this character,like that of indumentum,is often subjected to variation under climatic and edaphic conditions.The inclusion of such forms and varieties within the limit of the species is justifiable.I do not mean to imply that leaf shape does not provide useful data in the delimitation of species,subspecies and varieties.There are, of course,some species where general shape and the character of base and apex of the leaf are more or less uniform,and are in close conformity with other diagnostic characters

Inflorescence:- The inflorescence system in Silene is very complex and the different types that are met with in different sections are the various modifications of the cyme.In the primitive species (so considered on a correlation of characters),the general type of inflorescence is a panicle

or raceme of cymes, and from this type other forms of inflorescence viz. dichasium and monochasium, have developed. Therefore, dichasial and monochasial inflorescences are found in the advanced sections. These different types of inflorescence with their gradual change from one type to the other, are described below.

The usual type of inflorescence in such sections as Paniculatae, Viridiflorae and Lasiostemones is a panicle of cymules. It has got an elongated axis which ultimately ends in a flower, and from the lower part it gives rise to lateral branches. These lateral branches, which are opposite, bear 3-5 or 7 flowers in perfect dichasia and are usually termed cymules. Rarely in these sections, the cymules are I-flowered. In sections Paniculatae and Viridiflorae the cymules are either ascending or ascending-erect, and accordingly the inflorescence may be lax or more or less congested. The shape of the panicle varies greatly in the section Lasiostemones : in S. longipetala Vent. the cymules are long, spreading and in turn are cymosely branched, so that the inflorescence in this species is diffuse; whereas in S. olympica Boiss. and S. saxatilis Sims. the cymules are short and usually I-2-flowered, the panicle having the form of a raceme.

From this typical panicle of cymules two different types of inflorescence have developed by gradual shortening of the cymules which is often accompanied by the reduction in size of the flower. I. In sections Chloranthae, Tataricae and Graminifoliae, the main axis is long, but the lateral cymules are usually very short and bear I-3 flowers at or near the

nodes.Sometimes the lower 2-3 pairs of cymules may become elongated to some extent and bear 5-7 flowers.In general,the inflorescence appears as raceme-like

2. The inflorescence in the sections Otiteae and Holopetalae has undergone more modification.Here the main axis is long,simple or branched and the lateral cymules which are opposite are very much condensed and bear clusters of pedicellate flowers at the nodes in a pseudo-verticillaster. But in S. Otites(Linn.)Pers. and S.venticrosa Adam there is a tendency to eliminate the internodes between verticels,and there by the clusters of flowers become crowded.Thus in S.Otites (Linn.)Pers. var. umbellata Otth and S.capitellata Boiss. we get a more or less capitate cyme.

The third trend of evolution from the panicle is found in the sections Spergulifoliae,Ampullatae and Suffruticosae The inflorescence in these groups is a panicle,but the axis is short and the lateral cymules are few, and usually alternate. The flowers are crowded at the apices of the cymules.Gradually by suppression of the cymules at the lower part,leaving only a pair of cymules below the terminal flower,this panicle has given rise to a dichasium(biparous cyme).Hence in the section Suffruticosae we get both a panicle of cymules as well as dichasial cyme.

From the simple dichasium which comprises a terminal flower with two lateral branchlets below it ending in a flower, the complex (compound) dichasium has developed by the repetition of the same apparent dichotomy in each lateral branch.The dichasium may thus be simple or compound,and is found in the

sections Brachypodae, Brachyanthae, Inflatae and Odontopetalae etc. In sections Pinifoliae, Auriculatae, Macranthae the flowers are solitary and terminal. The solitary terminal flower I have not considered as a primitive condition, but to have been developed by reduction from a simple dichasium by suppression of the lateral flowers.

A gradual change from the dichasium to the monochasium is best illustrated by a few species. In S. ramosissima Desf. and S. nicaeensis All. the inflorescence is more or less a dichasium, but one of the branches of the dichasium becomes shortened while the other branch is long; as a result, the monochasium develops. In other species of the sections Atocion and Leiocalycinae the inflorescence is a dichasium below, but the lateral branches end in monochasia. A monochasium has therefore evolved from a dichasium in which one branch of each dichasium continues to develop while the other branch is completely suppressed. As a result of this, we get a sympodial axis composed of a series of superimposed axes. This monochasium is phyletically complex and is found in the advanced and annual species.

The fig. I (a-i) shows the different types of inflorescence that have developed from the panicle by gradual reduction in the length of the lateral cymules, then followed by suppression of the lower cymules and ultimately one of the branches of every dichotomy. The diagram is modified from Lawrence (1951).

The various types or forms of inflorescence that have been discussed above, although they more or less constant for the sections, may show variation within the limit of the

Fig.1.

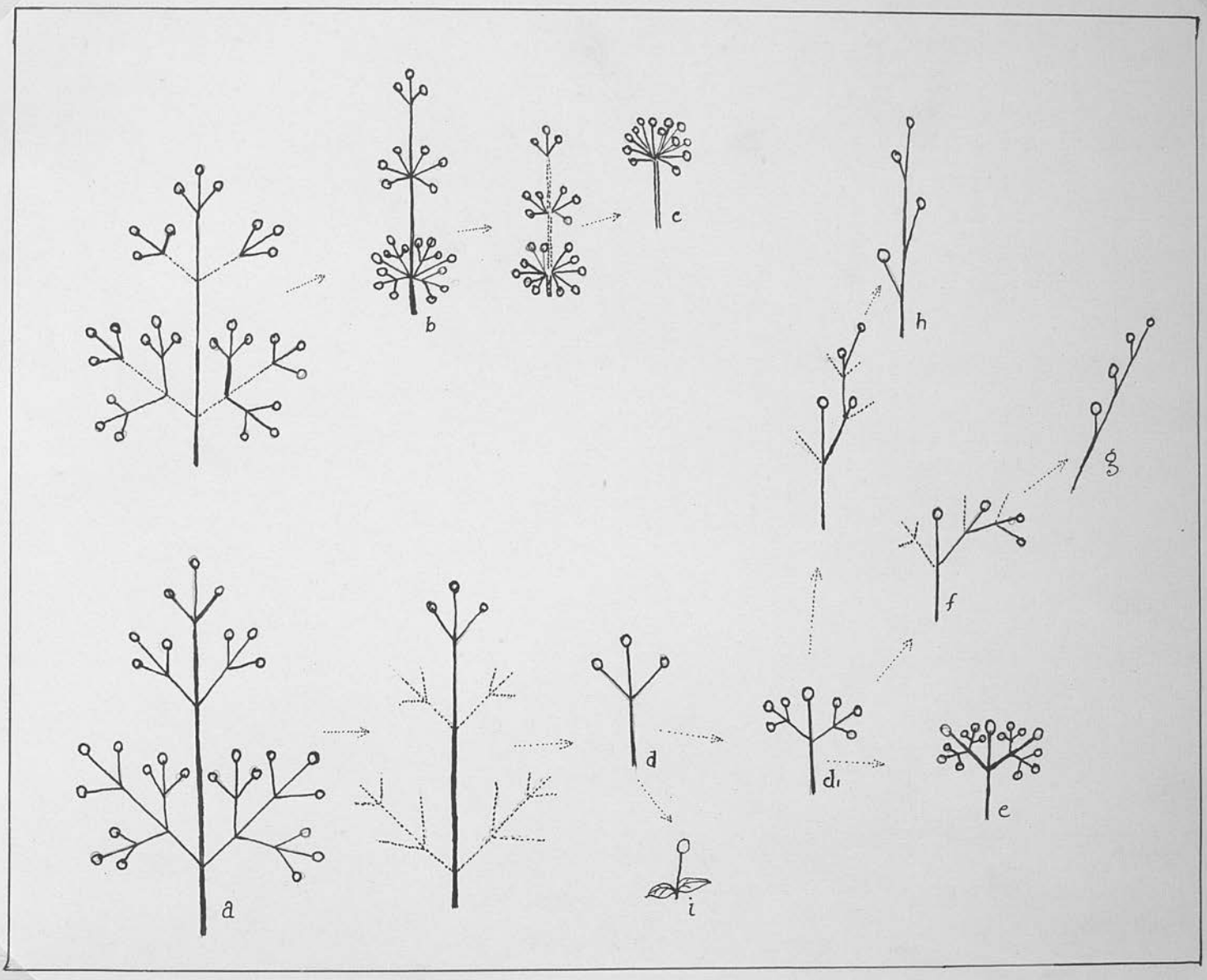


Fig.1. Evolution of different types of cymose inflorescence from a panicle of cyme-a.-panicle of cyme;b.-pseudo-verticellaster; c.-capitate cyme;d.-dichasium;d_1.-compound dichasium; e.-corymbose or umbellate cyme;f.- monochasium(helicoid); h.-monochasium(scorpioid);i.-solitary flower.

section or even (in a few cases) within the species.For this reason,Boissier,while dividing the genus into sections,wrote in his " Flora Orientalis" that Silene is " A genus very difficult to breakup into groups of species,since the characters for defining sections are either absent or not strongly marked. Thus Godron demonstrated that all forms of inflorescence which were met within the genus,the dichotomy,the panicle,the unilateral raceme,are only modification of the cyme, and that they pass one into another in allied species,and even in plants of the same species". Neverthe less the types of inflorescence, together with other characters,have been considered in the present work as useful criteria for the division of the genus into sections.

Pedicels:- The length and thickness of the pedicels vary in the different species.In section Rigidulae the pedicels are long,filiform and more or less rigid,while in others the pedicels are more or less thick.They are either glabrous or puberulent;the pubescence is usually of the same nature as that of the calyx subtended by it.

Another important point to consider in connection with pedicel is the movements exhibited by them at or after anthesis.In sections Dichotomae and Erecto-refractae and subsection Divaricatae of section Atocion the pedicels change their position at or after the maturation of flowers. In other sections they donot change their position or their movements (if there be any) is not conspicuous.So the length,pubescence, size and movements of pedicels may provide useful data for the delimitation of sections and subsections,but mostly often

for the separation of allied species.

Flowers:- A complete pentamerous flower consists of a gamosepalous calyx,5 free clawed petals,and a superior stalked ovary surrounded by two series of stamens.

The colouration of the petals varies from pink to white ,or sometimes yellowish to greenish white. Earlier taxonomists used to differentiate populations of the same species into groups below the specific categories on flower colour,but it is found that colour is not a reliable character for such subdivisions. We must bear in mind,in proposing such subdivisions,that in the wild state intraspecific hybridization and back crossing may occur quite freely and by this process there may be a mixture of a dozen ~~of~~ characters,of which colour may be one ~~of them~~. So we may get in the same population,a gradation of different colours.

Although the flowers are usually bisexual,cross-pollination is of general occurrence in this genus.The condition is favoured by the dichogamy of the sexual organs.In such flowers the androecium usually matures first followed by the gynoecium.I have also noticed in some species that the reproductive organs are dimorphic - stamens are usually of two different lengths in the same flower,whereas the flowers are heterostylic-i.e. carpels with long styles in some flowers and short styles in others. So it may be concluded that dichogamy of the essential organs is usual for many species, and that the flowers are usually protandrous.Where this phenomena does not occur, modification in the form of floral dimorphism is believed to have developed.In either case,cross-

pollination will be the rule

In some species the flowers are unisexual,and the plants are either monoecious or dioecious or polygamous.Even in the bisexual flowers there is a tendency to become unisexual (usually pistillate) by suppression or abortion of one sex.

Entomophily is predominant in the species of Silene and to achieve this end the flowers are variously adapted to attract insects.The various adaptations that are commonly met with are the colour of petal , scent,anthophore,and the production of nectar. Most of the species of Silene have flowers that are coloured.In the evening or night-blooming species,in which the petals are usually whitish, the flowers generally emit a scent by which they attract insects.The nectar secreting glands are situated near the base of stamens on the anthophore.In flowers with a long calyx the anthophore becomes correspondingly elongated,so as to raise the glands and make them easily accessible to insects.In the daytime bees, butterflies, and hover flies bring about pollination,while at night moths do the same.In certain dioecious species like S.Otites, anemophily is said to occur.In S.Otites the flowers are colourless and the styles and stamens are all exserted,so that the flowers may utilise the wind though the presence of nectar-secreting glands show that entomophily is also prevalent.

Flowers are usually erect at and after anthesis,but there are some species in which the flower is bent downwards either at or after anthesis.A.Otth used this character in his grouping of species,but if this character is applied to sections (except section Viridiflorae and subsection Nutantes), it leads

to the separation of closely allied species or forms.

Calyx:- The shape of the calyx varies in different species. It may be cylindrical, cylindrical-clavate,clavate,campanulate or ovate-campanulate.The indumentum of the calyx is various,and provides an important character for the delimitation of species, subspecies and varieties.The calyx may be inflated at anthesis, as we find in certain sections as Inflatae,Odontopetalae, or semi-inflated as in sections Cordifoliae,Cucubaloidae.In other sections the calyx is not inflated.Usually the shape of calyx in fruit is not the same as we get in flower;the calyx either becomes club-shaped,subglobose,oblong,oblong-ovoid or campanulate in fruit.The fruiting calyx apart from its shape,often exhibits some other peculiarities-

In most sections the base of the fruiting calyx becomes constricted below the capsule,while in a few sections this is not so.Insections like Lasiocalycinae,Leiocalycinae and Gallicae the apex of the fruiting calyx becomes contracted. This constriction at the base and that of apex often provide useful sectional characters.

The structure of the calyx differs from one section to another.In Sclerocalycinae,the calyx is coriaceous and glabrous,and the nerves are not prominent.Such a calyx is characterized by the pseudo-umbilicate base, making this section unique in the character of the calyx.In sections like Chloranthae and Tataricae the calyx is sub-coriaceous and the base is slightly umbilicate;whereas in the rest of the sections the calyx is membranous and the nerves are prominent.Such

membraneous calyces are usually thin and variously puberulent and glandular.Their bases may be umbilicate or truncate. In Lasiostemnes the calyx,though membraneous,is firm in texture and is scabrous or glabrous

In all species of Silene the lateral nerves of the adjacent sepals are fused inpairs from the base and lie along the commissural line.These nerves are therefore termed "commissural".The basic number of nerves in Silene is IO, of which 5 are median and 5 commissural.This character has become fixed in the genus,in fact in the subtribe Silenoideae, though the nerves,median or commissural or both may branch from near the base or from the upper part.Thus the number of nerves in the species of Silene varies from IO-30 or even 60. In section Conosilene the number of nerves varies from 20-30 sometimes 60.These nerves are more or less parallel, and are usually without any lateral veinlets.In other sections the number of nerves is generally IO, and in a few sections varies from IO-20.When the nerves are IO-20,they are branched and reticulately anastomosed.But there are a few species (as S. squamigera Boiss.,S.vesiculifera J.Gay and S.Coeli-rosa(Linn.) A.Br.) where the number of nerves is IO and they are more or less simple.Earlier taxonomists used the term "evenius" for such nerves, and used it as a good character for delimitation of sections as well as species. But the true nature of'evenius' is somewhat obscure.Many species with the calyx nerves 'evenius' have been found actually to have more or less anastomosed nerves,and, on account of this, these species have had to change their places from one section to another at the hand of

different authors.For example,S. linicola Gmel., which is closely related to S. crassipes Fenzl, was placed in the section Leiocalycinae where the nerves are anastomosed, and S. crassipes Fenzl was kept in the section Lasiocalycinae where the nerves are simple 'evenius'.C.A.Lindman referred S. crassipes Fenzl to the section Leiocalycinae,as he considered the nerves to be anastomosed.The nerves of S.linicola Gmel. and S. crassipes Fenzl actually emit a few short veinlets which are anastomosed above to give the main nerves the appearance of being simple and thickened above.S.laevigata Sibth. & Sm. has been described as 'evenius' but examination of specimens from the type locality shows that the main nerves emit a few short veinlets above which anastomose.With one or two examples I want to conclude this discussion.S.tenuicaulis Freyn & Bornm. was established as a new species on the character of the nerves. The nerves have been decribed as simple,'evenius'.But later on Bornmuller himself reduced this species to the synonym of S.longiflora Ehrh ssp. staticifolia (Sibth. & Sm.) Hayek. I have examined the isotype at Kew and have found the nerves to be of the same nature which I have described in connection with S.linicola Gmel. and S.crassipes Fenzl.The same reason may be put forward in support of reducing S. megalocalyx Freyn to a synonym of S.longiflora Ehrh

Turning to the calyx teeth we find that the shape size and nature of the teeth vary from one species to another. The general shape and size of the calyx teeth show some constancy, but the teeth whether they are acute,obtuse or round can seldom be considered as a reliable diagnostic.The teeth are

surrounded by a membraneous margin;the width of this membraneous margin is very variable; and the degree to which it develops probably depends on the external conditions;this affects the nature of calyx teeth.This variation in the tooth shape is usually of general occurrence in the polymorphic species.A simple illustration may be taken from S.bupleuroides Linn.,S.picta Pers. and S. rigidula Sibth. et Sm. In S.bupleuroides Linn. the calyx teeth are said to be all lanceolate and acute (cf. Boiss.,Fl.Or.,i,639,I867),but the examination of the type specimen at the British Museum,London shows that out of I3 or I4 flowers about I0or II have got their calyx with obtuse and acute teeth which alternate with each other.So the independent status of S.bupleuroides Linn. is very doubtful, as the other characters of the flower and vegetative parts are similar to those of S.lingiflora Ehrh. S.picta Pers., which grows in Syria and certain parts of Turkey, is distinguished from S.rigidula Sibth. et Sm.,growing in Greece and in some islands off the Turkey shore by the following characters- S. picta Pers. has spathulate leaves, lanceolate and acute calyx teeth, and the lobes of the lamina obovate-oblong, broadly ovate or oblong; while in S. rigidula Sibth. et Sm. the leaves are oblong-linear,the calyx teeth ovate obtuse and the lobes of the lamina oblong.I have examined specimens from the type localities and have found that in all three characters they are variable. Leaves in S. picta Pers. vary from oblong-spathulate to oblong-linear and calyx teeth from lanceolate acute to ovate obtuse. The shape of calyx teeth depends on the degree to which the white membraneous margin develops.These examples clearly show

that the calyx teeth alone are not trustworthy for delimiting all the species.They must be considered in combination with a number of other characters.

Corolla:- There are 5 free,conspicuous petals.Each petal has got two distinct parts,claw and limb.The petals are inserted on the apex of the anthophore,round the androecium. The aestivation of the petals in this genus is either contorted or imbricate, but one form may pass over to the other, even in the same species; so that this character can not be relied on.

The claw is the lower part of the petal which remains within the calyx.It is more or less expanded and the margin is membraneous.It is provided with 3 distinct nerves and is narrow at the base but expanded above.In some species,the claw becomes expanded in the middle portion and assumes the club-shape or clavate form; while in species of the sections Odontopetalae, Inflatae and Auriculatae the claw is expanded above and ends in two free lateral projections which are termed auricles.The size and shape of the auricles are often considered in the delimitation of the species,along with other morphological characters. But how far this character is constant it is difficult to say.In support of this,I may state that several species like S. nodulosa Boiss.,S. arguta Fenzl and S. Montbretiana Boiss. were included in the section Auriculatae by Boissier, but were subsequently transferred to the neighbouring section Macranthae by Rohrbach where the claw is exauriculate.Examination of these species shows that auricles are present but are usually small or obscure, being very seldom conspicuous. So this character cannot be considered

as a cardinal one in the delimitation of the sections.

The claw may be smooth or ciliate. In section Lasiostemones the claw is invariably pilose or ciliate. In other sections, this character is not reliable, as petals of different flowers on the same plant may be smooth or ciliate. As an instance I should like to mention S.italica (Linn.) Pers. This species belongs to section Paniculatae subsection Patulae. Rohrbach characterized this species, along with some others, as having a ciliate claw. But Willkomm in his 'Prodr. Fl. Hisp.', put down " ungues petalorum glabri" as a diagnostic character for this species. So in the character of auricles, and the presence or absence of cilia on the claw, it is difficult to find authors in agreement.

The length of claw varies in different species. In some species the claw is included within the calyx, while in others it is more or less or conspicuously exserted. This exserted claw is prominent in the section Succulentae

Presence or absence, shape and size of ligules are useful for the purpose of identification of the species. The limb of the petal is another important part which provides data for the delimitation of species, and sometimes sections. The general shape, width, degree and number of segmentation of the lamina and its colour may all serve for the separation of species. In some sections, e.g. Otiteae, Holopetalae, the limb or lamina is entire and eligulate, whereas in sections Fimbriatae and subsection Laciniatae of the section Paniculatae the lamina is multipartite and in other sections it is usually bipartite.

But the degree of incision of the lamina and the size of lobes are less reliable.

The lamina, in few sections and subsections like Conosilene, Denticulatae and Delicatulae, has got two ,small, teeth-like outgrowths on the two sides.These outgrowths may be at the base, as in the section Conosilene, or at the middle part as in subsections Denticulatae and Delicatulae. In other sections there are no such outgrowths.

Carpels:- The syncarpous pistil is usually composed of 3, sometimes 4 or 5 (very rarely 2) carpels,with initially axile placentation.Upto maturation, the ovary shows the remains of septa;in later stages,the septa, usually in the middle and upper region of the ovary sometimes throughout, become delicate and fragmentary and often disappear entirely.The ovary is therefore unilocular or more or less plurilocular at the base.The mature ovary often has the upper portion cartilaginous and stiffer in consistency than the lower portion.In some species the wall of the ovary is of uniform consistency being either thin or thick.

The number of styles corresponds to that of the carpels.They are free, smooth or more or less puberulent; either included or conspicuously exserted.The stigma is slightly thickened and often recurved.

Anthophore:- The length of the anthophore varies in different species.It may be smooth or hairy.In the delimitation of species the average length of the anthophore, presence or absence of hairs on it provide useful criteria.

Fruit:- The fruit of species of Silene , with one exception (S.ampullata Boiss.) is a dehiscent capsule. The capsule represents a diversity in shape and size, but within specific rank there is some constancy with respect to these features.The relative length of capsule and anthophore affords a good diagnostic character. Apart from this , the relative length of capsule and calyx also plays an equally important part in the separation of species.Usually the capsule is included in the calyx; in a few species as in S.falcata Sibth. et Sm., S. Saxifraga Linn. and S. saxatilis Sims, the capsule is conspicuously exserted at maturity; while in others like S. armena Boiss. the capsule protrudes somewhat beyond the calyx.These characters of the capsule afford useful criteria for distinguishing species rather than sections

In S. ampullata Boiss.the fruit is a few-seeded and indehiscent.This few-seeded fruit of S.ampullata Boiss. retained in the much inflated calyx must be considered an advanced dispersal mechanism.

Seeds:- Seeds are either more or less compressed, or widely reniform.The compressed ones have their faces flat and the back deeply grooved with two wavy wings.The widely reniform seeds have convex, flat or grooved back and the face is flat, convex,concave or excavate. The back as well as the face of the seed may be smooth, or with some granular or papillose outgrowths.But these outgrowths differ in different species.

The colour of the seeds varies from light brown to reddish brown or dark brown.In some species (S.dichotoma

Ehrh.) they may have an additional silvery tinge. The ornamentation of the surface and the colour of the seeds are useful in the separation of species.

Within the limits of the groups of allied forms the seed varies chiefly in size, scarcely in form and shape. However, in widely distributed and polymorphic species like S. Cucubalus Wibel and S. gallica Linn. we find transitional modification in the form of seed.

Indumentum:- The unreliable character for the limitation of species is that of the indumentum, particularly of the vegetative parts. This character often depends on the external conditions, and on the difference in the stations and in vertical range. The indumentum of the calyx is much more reliable & can be used in the delimitation of species, subspecies and varieties along with other morphological characters.

Indumentum of the vegetative parts and the calyx consists of three general types- (a) long, more or less stiff eglandular hairs; (b) glandless hairs which are usually short; (c) glandular hairs

The hairs of calyx may likewise be of different types, though, here the glandless hairs may be of two different kinds - hairs with and without a bulbous base. The hairs with bulbous bases have probably given rise to the scaly hairs, characteristic of subsection Squamatae. In other sections and subsections the hairs, if present, are usually without bulbous bases.

The presence of a certain type or combination of

types of indumentum is often fairly constant within a species, subspecies or varieties though the density of the indumentum is often subjected to variation. On the whole indumentum serves as a valuable additional criterion of classification.

CYTOLOGIC CRITERIA

Our knowledge of the morphology and number of chromosomes in the species of this circumboreal genus is still insufficient.Out of nearly 500 species,the chromosome number has been counted in 82 species and this is largely due to the works of D.Löve, K.B.Blackburn and A.R.Kruckeberg.

On the continent 63 species (including 4 Melandrium) from round the Mediterranean countries have been studied cytologically.It was reported by Blackburn that 7 species show polyploidy and the rest diploidy with the basic haploid number I2. S.ciliata Pourr.,which has two geographical subspecies presents an interesting feature .As pointed out by Blackburn, both the subspecies show polyploidy in addition to the diploid chromosome . In the Italian subspecies, which contains 24 and 48 chromosomes,the population with 48 chromosomes shows some gigantism.While the Spanish subspecies with 24, 48 and I92 chromosomes, does not show any difference in size.So the difference in size can hardly be attributed here to polyploidy.

D.Löve,while describing the chromosome in some species of Silene remarked that speciation in the Silenoideae is not usually due to polyploidy.Löve described that S.Bastardi, which has been treated by many taxonomists as a variety of

S.maritima, has the same number of chromosomes,but they are of different shape.So the size and morphology of the chromosome are responsible for such variation at specific and intraspecific level.

In N.America the study of the chromosome and interfertility has been undertaken by various workers. I9 species were studied by A.R.Kruckeberg cytologically,and it was found that all of them are polyploids.It is not known whether there are auto- or allopolyploids.In species like S. Scouleri Hook.,S.Menziessii Hook.,S.californica Durand, S.Parryi (Wats) H.& M. and S. subcilata polyploid series are found in the same species or subspecies , but the different chromosome numbers are not correlated with any size difference or other criteria of taxonomic value.We know very little about interfertility,natural hybrids between species being rare (S.Cucubalus X S.maritima being an example).

When the chromosome morphology and interfertility of the species are known,it will help the taxonomists to work out a better classification as well as to delimit the species.

GEOGRAPHICAL DISTRIBUTION

I have attempted as far as possible to mark out the geographical distribution of each species occurring in the Orient, and also to indicate how many of them are endemic.These have been discussed under each taxon.Under this heading I have also indicated the distribution of the species outside the Oriental Countries.From this discussion

it will be seen that a number of species are endemic.The list of these endemic species does not claim to be complete or accurate, as our knowledge on the flora of these countries is still inperfect.Further exploration may lead to the collection of new species or specimens of known species which are supposed to be endemic, and the limit of some of them may, to some extent, be enlarged.

The present discussion deals briefly with the distribution of the genus as a whole.The genus Silene occurs mostly in the warmer and temperate parts of all continents, having reached its greatest development in the warm temperate regions.Out of nearly 500 species (enumerated by Williams) about 210 species occur in the Orient, and most of these in Turkey.It seems that the main centre of distribution is ~~the~~ in Caucasia ,and hence ~~the~~ N.E. Turkey and N. Iran have the maximum number.Europe comes next with about 170 species.North Africa possesses a considerable number.In America,Silene is represented by 54 species (Hitchcock and Maguire,1947).In other countries like China and India it is represented by a comparatively smaller number of species.Apart from these there are a few species,like S.acaulis and S.repens ,which are circumpolar while S.Cucubalus and S.gallica are almost cosmopolitan in their distribution.

The ecological relation of the species has also received attention whenever the data are available.

With these considerations,I have attempted to arrange the species into sections according to general characters and habit.In most cases these sections are natural

and well defined, but in a few cases they overlap one another in one or a few characters.

Sectional and subsectional characters:-

1. General habit of the plant.
2. Character of the caudex and that of the stem.
3. Types of branching including the inflorescence.
4. Leaves- caudical vs cauline leaves, and their fasciculation
5. Shape of the flowering and fruiting calyx and its structure
6. General shape of the petal
7. Shape of the capsule
8. Seed form (in a restricted sense).

Characteristic used for the delimitation of the species;-

1. Indumentum of the calyx & to some extent of the vegetative parts.
2. Shape of leaves and their nervation.
3. Nature and length of pedicels.
4. Shape and nervation of the bracts.
5. Shape of the calyx, its colour & nervation and character of calyx teeth.
6. Character of the claw and the presence & absence of auricles
7. Shape of the lamina & degree of its incision together with the number of the lobes.
8. Shape of ligules and their absence.
9. Length and character of the anthophore

10. Shape of the capsule and its relative length in comparison to the anthophore and the calyx.

11. Shape and size of the seed, its colour and the character of its surface.

INTERGENERIC RELATIONSHIPS

In an attempt to review the intergeneric relationship of the members belonging to the subtribe Silenoideae Williams, it has been found necessary to re-examine and re-assess certain complex genera in the light of the recent works of a number of critical students. The conclusions thus arrived at from the examination of herbarium material are expressed in this chapter, but as field observations experimental and cytogenetical data are usually lacking, a more satisfactory interpretation of the genera must await further study.

The limits of the genera in this subtribe have always been rather artificial, and were made to rest chiefly on the number of parts of the floral organs. So in this subtribe (as in the other subtribe or tribe of the family) the genera so constituted are not wholly natural. The technical characters which were used to separate them by different taxonomists have been found to vary considerably, and are often not connected with the habit of the plant or other vegetative characters.

Taxonomists at different time have tried to discover characters for a satisfactory classification of the genera; while doing so they selected many characters, particularly from the flower. These characters are :-

i. the number of styles

ii. the relative position of carpels to the segments of the calyx- whether alternate or opposite to the lobes of calyx

iii. nature of the fruit- berry or capsule

iv. character of the seed coat

v. the nature of the capsule valve- entire or cleft

vi. internal structure of the ovary- with or without dissepiments.

Taxonomists, stressing one character or another proposed new genera.

Linnaeus recognized 4 genera, viz. Agrostemma, Lychnis Cucubalus and Silene . Linnaeus also proposed a new genus Coronaria in his first and second edition of "Genera Plantarum", but he fused this genus with Agrostemma in " Species Plantarum". Later on, this genus Coronaria, along with some species of Agrostemma, was separated and sunk in Lychnis. This fusion of Coronaria with Lychnis has been supported by many, including Engler & Prantl and Hayek.This has been accepted by the present writer. Others, like Williams and A.Braun,treated Coronaria as a distinct genus.

In 1812 Rohling proposed a new genus,Melandrium, comprising a few species of Lychnis with inflated calyces & the teeth of the capsule splitting into two,so as to become double in number to those of the styles. Viscaria Rohl. was originally proposed for a few species belonging to Lychnis, in which the ovary is shortly divided at the base- a slight rudimentary indication of the ancestral septate ovary- and of little importance as a generic character.A few species of Viscaria Rohl. were again separated by Reichenbach under the name Eudianthe, characterized by having capsular teeth split.

The genus Heliosperma Reichb. was proposed for a few small flowered Silenes in which the ovary is unilocular, the capsule dehisces by twice as many teeth as there are styles, and in which the seeds are crested on the dorsal surface. Petrocoptis A.Braun, comprising two Pyrenean species (L.nummullaria Lapeyr. and Silenopsis Lagascae Willk.) has a more definite character in having imbricate aestivation and seeds bearded at the hilum. Thus the 5 Linnean genera increased to 9 .Rohrbach accepted all these genera except Eudianthe which he sunk under Silene. Williams recognized all the 9 genera. Some recent taxonomists differ from these workers, and prefer the fusion of some of the smaller genera with old established ones (Heliosperma and Eudianthe with Silene, Melandrium with Lychnis).

In order to test the value of these genera, I have tabulated the characters depended upon by those who maintained the genera as distinct. Along with it, I have included two more tables - one with the summary of the result obtained from the examination of the species and genera from all over the world and another with the original readings [Tab.I-3]. *

Now, considering how to deal with these various proposals, we must bear in mind that many of the genera hitherto constituted must be defined by characters that do not undergo many exceptions. What is that character and how to define it? It has been seen that a character which may be of taxonomic value for one group of species or genera may break down in another group. In this connection Williams, quoting Nageli, has rightly remarked that there is no character for a group of

[*Tab.2 & 3 -see at the end.] P. 552 a-d]

TABLE I.

Tabular comparison of the characters of Silene & allied genera.

Name of genus	habit	inflorescence	ovary	Capsule	seed	styles
Silene	annual or perennial, often tufted	mono- or di-chasial cyme, or panicle of cyme	3-celled, ∞-few-ovuled. (3-5-celled)	dehiscing by 6 teeth (6-10)	with various markings or winge-d	3, often 5
Heliosperma	perennial, straggling plants	dichasium	1-celled	dehiscing by 6 teeth	crested	3
Melandrium	biennial or perennial	dichasium or panicle of cyme	1-celled	dehiscing by 6 or 10 teeth	like those of Silene	5 or 3 (5-3)
Eudianthe	annual or perennial	dichasium	5-celled	dehiscing by 10teeth	do	5, rarely 3
Lychnis	perennial	dichasium or panicle oh cyme	1-celled	dehiscing by 5-teeth	like those of Sileme	5
Viscaria	perennial, plants tufted	panicle of cyme	5-celled	dehiscing by 5 teeth	like those of Lychnis or Silene	5

genera or species, however important it may seem to be, whether morphological or physiological, which is of taxonomic value for all groups of genera or species. In each group we must select by analogy what character in a particular grade of subdivision is of systematic value. Our object has therefore been to find out such limitations as may bring together species having the greatest general resemblance, and united by such characters as should have the fewest exceptions.

The following characters appear to have taxonomic value in the limitation of genera:

i. Nature of the fruit- (whether a capsule or berry-like)
ii. The relative position of the carpels to the segments of the calyx-(opposite or alternate)
iii. Character of the capsule valves-(entire or cleft)
iv. Character of the seed coat
v. Character of the calyx (inflated or not; membraneous or not); character of the calyx nerves
vi. Number of carpels (with restricted sense)

These characters are of primary importance for delimiting the genera, to which we can add the general habit of the plant. The number of carpels has been considered to have secondary importance and the reason for such consideration has been given in the subsequent paragraphs. The internal structure of the ovary, with or without dissepiments, has been found to have little or no taxonomic value as will be shown in connection with the validity of the genus Melandrium . The characters of the genera related to Silene are annotated and discussed below.

In Agrostemma Linn. the carpels alternate with the segments of the calyx, while in other genera, except Uebelinia, they are opposite. Apart from this, the calyx is coriaceous with foliaceous teeth, the anthophore is absent and the petals are entire and eligulate. In habit and character of calyx (except the teeth) it comes near to Lychnis subgenus Coronaria (Linn.) Engler & Prantl, but differs in the characters mentioned above. These few characters are sufficient to keep Agrostemma as an independent genus (with the type species A.githago Linn.)

Cucubalus, as circumscribed by Linnaeus, included a number of Silenes with very much inflated calyces, but since then has been restricted to the Cucubalus bacciferus Linn. in which the fruit, although not exactly a berry, does not open by valves. The plant's scrambling habit is not paralleled in Silene. Silene ampullata Boiss., having an indehiscent 1-2-seeded fruit, comes near to this genus, but because of the considerable difference in habit and the floral character, the recognition of Cucubalus as a monotypic genus is ~~very well~~ justified.

Petrocoptis A.Braun is evidently near to Lychnis subgenus Coronaria (Linn.) Engler & Prantl, but differs from the latter in the imbricate aestivation of the corolla and in the seed having a bearded hilum.

Heliosperma Reichb., with the habit and capsule teeth of Silene, differs from the latter only in one character: the seed is crested on the dorsal surface. Neither Boissier nor Hayek recognized Heliosperma as a distinct genus, and kept its species in Silene. But Petrocoptis A.Braun (type species P.Lagascae Willk.) and Heliosperma Reichb. (type species H.quadrifidum (Linn.) Reichb.),

largely on the character of their seeds, are treated here as independent genera,although they do not have a distinctive facies.

Eudianthe Reichb. (type species E. coelirosa (Linn.) A.Braun) consists of 3 species.Rohrbach did not recognized this genus.He sunk it under Silene, and placed the species in three different series- S.nivalis (Kit.) Rohrb. under series Polyschemone, S.laeta (Ait.) A.Braun under Lychnioideae , and S.coelirosa (Linn.) A.Braun under series Eudianthe. Pax and Hoffmann in Engler & Prantl's " Die Natürlichen Pflanzenfamilien" united these 3 series under a section Pleiogynae,and raised the series to the level of subsections.S.laeta (Ait.) A.Braun, which is an annual and from the same area, differs from S.coelirosa in the shape and size of the calyx, and in having long pedicels, but the calyx teeth, nature of the calyx nerves, colour and shape and size of petals and size and nature of the seed are the same.In addition to these characters,the calyx nerves often develop scales though they are usually small and inconspicuous. Considering these features,I think S.laeta (Ait.) A.Braun is related to S.coelirosa (Linn.) A.Braun . Between S.coelirosa (Eudianthe coelirosa (Linn.) Fenzl) and some the species of Silene, the only distinction is the number of carpels (5 in Eudianthe and usually 3 in Silene); the species of the so-called genera,otherwise so closely simulate one another that they are nearly inseparable in habit and other characters.The annual species, S.coelirosa (Eudianthe coelirosa), which has 5 carpels, often develops papilliferous scales on the nerves which is an important character of the section Lasiocalycinae subsect. Squamatae.In some species of Silene

the number of carpels is variable,usually 3, but frequently 4 or 5 .Probably in S.coelirosa and S.laeta ,the higher number (5) has become fixed.Moreover,it has been admitted by many taxonomists that strict adherence to the number of carpels may lead to the separation of allied species.With these consideration in view, I should like to sink the genus Eudianthe (excluding E.nivalis (Kit.)Williams) in Silene. E.nivalis, which has the habit of Viscaria,but the calyx and its nervation, number of carpels,and capsule valves of Lychnis , has been transferred to the latter genus.

Out of 4 Linnean genera,the two complex genera, Lychnis and Silene,have sufferred much violence by the constant lumping and splitting of species at the hands of different workers. The limits between these two genera are less natural and less accurately defined than in the other genera accepted here.The character of 3 (rarely 5) styles in Silene, and 5 (rarely 4 or 3) in Lychnis, although not quite constant,was only the distinction between them recognized by Linnaeus.To this character another important diagnostic was recognized later on : the nature of the capsule-valve (split in Silene,entire in Lychnis).Specimens of many species of Silene frequently develop 4 or even 5 carpels; similarly at the same time the number of carpels in some species of Lychnis is variable,being frequently 4 or 3, so that the number of carpels does not provide a decisive cardinal factor for diagnosing the genera. Therefore, the species with a variable number of carpels must be referred to the genus to which it shows the greatest resemblance in habit and in other floral characters including that of capsule-valve .

Viscaria Rohl. was proposed for a few species of

Lychnis in which the capsule is shortly divided at the base into 5 cells. Otherwise these species have the same facies as those of other species of Lychnis. The capsule dehisces by 5 valves or teeth- like those of true Lychnis. Therefore, for the reason stated in connection with Melandrium, I proposed to sink Viscaria in Lychnis. Lychnis (including Viscaria) is treated here as a distinct genus and the characters limiting it are as follows -Calyx clavate or shortly campanulate, more or less narrow, never conspicuously inflated, usually firm in texture; nerves of the calyx 10, more or less anastomosed above, but not bifurcating so as to increase the number of nerves; carpels usually 5; capsule 5-dentate. The type species is Lychnis flos-Cuculi Linn.

This Silene-Lychnis complex has been made more complicated by the creation of a third, less well-defined genus, Melandrium Rohl.. Melandrium, apart from having 5 carpels, has inflated calyces, and teeth or valves of the capsule splitting. To these characters, a new diagnostic - the absence of dissepiments in the ovary - has been added by later workers. Consequently, most of the species of ~~Silene~~ Silene with a variable number of carpels and a unilocular ovary have been included under Melandrium by other workers.

I have analysed the available herbarium material in order to test the ~~consistency~~ constancy of these characters. From the analysis, it is found that the species of the so-called Melandrium genus fall into 2 distinct groups. In one group (typified by M. ~~affine J. Vahl~~ apetalum (L.) Fenzl) the species are of dwarf, tufted habit, and are characterized by a membraneous and very much inflated, campanulate calyx, and large, compressed, more or less reniform seeds with an inflated testa. The primary calyx nerves usually

bifurcate, the nervelets becoming reticulately anastomosed. The inflorescence is either raceme-like and few-flowered or more usually consists of a solitary terminal flower. Apart from these characters, the number of carpels is generally 5, seldom 4 or 3. So this group of species has a constant correlation of morphological characters. It is found scattered throughout the Northern hemisphere, and is certainly a natural group.

The second group of species (typified by M.rubrum & including M.Elizabethae) is largely centred in China and North America, has a variable number of carpels, (usually 3 throughout, but 4 or 5 is not uncommon), calyx inflated, semi-inflated, or not inflated, and the seed like those of Silene, being without an inflated testa. The majority of the species are tall, leafy and not tufted.

Before determining the status of these two groups, let us see what taxonomic value can be given to those morphological characters which have been used to support the treatment of Melandrium as a separate genus.

Paul Rohrbach recognized the number of carpels, the presence and absence of dissepiments in the ovary and the nature of the capsule-valve as diagnostic for the delimitation of allied genera, and depending on these criteria he circumscribed the limits of the genus Silene. The genus thus circumscribed included many species both from North America and the Old World which later on were transferred to Melandrium. There are many species involved, but I shall mention here only which evaluate the characters stated above. S.Drummondii was described by Hooker as a Silene .

Rohrbach followed Hooker in keeping the species in Silene. Williams transferred it to Melandrium. But the American taxonomists transferred S.Drummondii to Lychnis, as they found that the number of carpels in the species is usually 5 or 4. In spite of this, Rohrbach had included it in Silene. The inclusion of S.Drummondii in Silene offers 3 explanations -

i. with due respect to his usually accurate observation, Rohrbach either overlooked this character, or did not consider it to be important (which is difficult to accept)

ii. there may be a general tendency in some species of Silene to revert to the parental form. Due to this reversion, in some species the maximum number of carpels (5) has become fixed, while in others it either remains 3, or varies between 3 & 5

iii. the ancestral form which has given rise both to Silene (through Wahlbergella) and Lychnis has a pentamerous flower with 5 carpels and a septate ovary, in the course of evolution the number of carpels has been reduced to 3 or even 2. Hence reduction in the number of carpels has taken place in an ancestral group leading to the evolution of Silene. This reduction in number has become fixed in most of the species of Silene, while in others it still varies between 3 and 5

Out of these 3 possibilities, the 3rd explanation seems to be more logical in this particular group and it is in this light that we

can explain the frequent occurrence of 5 or 4 carpels in otherwise 'good' species of Silene

Turning to the presence and absence of the dissepiments in the ovary, it is difficult to find taxonomists in conformity. S.noctiflora Linn. has been described by Boissier as having a unilocular capsule, and my own observations and the majority of the continental taxonomists support this view Boissier. But Hitchcock and Maguire, in the revision of the North American species of Silene, stated that the capsule in S.noctiflora Linn. is trilocular (see page 15, University of Washington Publications in Biology, vol.13, 1947.) .S.viscosa (Linn.) Pers. was retained in Silene by Rohrbach, as this species has the facies of a true Silene, 3 carpels, and must have been thought to possess a trilocular ovary as it was kept within the limits of Silene. But later on Williams and others found this species to have a unilocular ovary. The same was the case with S.anrica Turcz., S.Olgae Rohrb. and many other species. The same explanation can be cited here as we have stated in the above paragraph. From these, one can we may conclude that there are two tendencies working - one leading to unilocular ovaries, and the other leading to the 3-carpelled condition.

In the genera Lychnis, Petrocoptis and Heliosperma, the species are found to have a plurilocular ovary if the ovary is examined at an early stage. dissepiments are ~~therefore~~ usually found to be present in the young ovary, though they are always thin and slender and have generally disappeared by the time the flower has expanded. The ovary of open flowers shows the remains of such dissepiments on the inner face. So throughout the subtribe there are dissepiments in the young ovary, especially at the base, and these may persist or

disappear at maturity.Hence the division of the ovary into cells can be regarded as a rudimentary residual character.The presence or absence of dissepiments in the Caryophyllaceous ovary can not be regarded as a diagnostic for the distinction of genera.In support of my views I may quote Robinson " the partial septation of the capsule, usually adduced as the strongest character for the division of Silene and Melandrium, is wholly untrustworthy in American species.Thus S. Virginica, generally referred by continental authors to Melandrium, often shows the partial septation of a Silene, while S.multinervia, a good Silene by habit and affinity to others of the Conoimorpha, has often no trace of septation.The number of carpels,the sole technical distinction between this and the next genus,is in some cases unfortunately variable."

Rohling recognized the importance of the capsule-valve in the limitation of the genera.American authors seem to have ignored this character altogether, and to have transferred the species of Melandrium with usually 5 carpels to the genus Lychnis.In the species of Silene the capsule teeth or valves are cleft or split so as to become double in number to the styles.A capsule dehiscing by 3 valves is hardly seen in Silene.On the other hand,in good species of Lychnis, the capsule opens by 5 valves, and we hardly ever find IO teeth in the natural state.In the species of the so-called Melandrium,the capsule dehisces by IO ,8 or 6 teeth.This shows that the splitting of the capsule-valve is a character of considerable taxonomic value.On the other hand,if one transfers the species on the basis of the carpel number alone,ignoring capsule teeth and habit, they are bound to be misfits in Lychnis or Silene group.

S.DrummondiiHook. is in habit and morphology strikingly similar to S.Scouleri Hook. and some other closely related species;but because of the prevalence of 5 carpels it was transferred to Lychnis where it was out of place.While supporting this transfer, Hitchcock and Maguire wrote " In fact ,L. Drummondii seems much closer phylogenetically to these species of Silene than to any American congener in Lychnis.But because of the prevalence of 5 styles,Watson transferred S. Drummondii to Lychnis. This transfer was accepted by Robinson.It is accepted by the present writers with reluctance because of the general similarity with the species of Silene pointed out above, and because commonly there are but 4 styles developed and occasionally only 3." .Melandrium album(Mill)Garcke was transferred to Lychnis by Hitchcock and Maguire,but this plant is often confused with S.noctiflora Linn., as the habit and floral characters,except the number of styles and the unisexuality of the flowers, are so similar.All these examples show that the number of carpels should not be the sole criterion for the distribution of species in such complex genera; at the same time it proves indirectly the taxonomic value of the capsule valve.

Having these considerations in view,I propose to keep the first group of so-called Melandrium (Gastrolychnis) as a distinct genus. The characters limiting it are - tufted perennial habit;inflorescence raceme-like or reduced to one or two flowers; calyx campanulate,much inflated at anthesis,calyx nerves varying from I5 -20, and reticulately anastomosed;petals inconspicuous, often included,with small ligules and bi- to multipartite blades. Carpels generally 5; capsule dehiscing by I0 teeth. Wahlbergella

Fries being an earlier and validly published name has been accepted here to represent this group, with W.affinis (J.Vahl.) Tolm as the type species.*

The 2nd group (Elisanthe and Eumelandrium) with a variable number of carpels, I propose to sink under Silene. This fusion of Elisanthe and Eumelandrium with Silene finds good support when cytogenetical findings are taken into consideration. Rohrbach, while discussing the crossing between Melandrium rubrum and S. viscosa, and M.pratense & S.viscosa, remarked that there is a greater sexual affinity between Melandrium and Silene than between Lychnis and Silene. Melandrium rubrum is said to hybridizes with S. noctiflora. The number of chromosomes in these allied genera is 24 , but data on the chromosome morphology is scanty. When more cytological data, as well as observations on interfertility are available, it is hoped that the findings will lend good support to my conclusion. It must be added, however, that Lychnis has the same basic chromosome number as Silene and Melandrium .

In transferring Elisanthe and Eumelandrium to Silene, the 2 familiar British species, M.rubrum and M.album , which in the past have often been included in Lychnis, must be included in Silene Sect. Melandriformes.*

With these consideration in view, I propose the following key to the genera which will illustrate their differential characters.

Key to the genera accepted :

1a. Fruit a capsule (rarely indehiscent)

2a. Capsule dehiscing by teeth equal in number to the styles:

3a. Carpels alternate with the calyx segments;

anthophore absent;petal entire,eligulate;
calyx with 5 long foliaceous teeth
.....Agrostemma

3b. Carpels opposite to the calyx segments;
anthophore usually conspicuous;petal usually
bipartite,ligulate;calyx teeth short:

4a. Seed not bearded at hilum;aestivation
contorted
.....Lychnis

4b. Seed bearded at hilum;aestivation imbricate
.....Petrocoptis

2b. Capsule dehiscing by twice as many teeth as the styles:

5a. Seed with inflated testa;styles usually 5;calyx
campanulate,much inflated;petal inconspicuous,often
included
.....Wahlbergella

5b. Seed with testa not inflated;styles usually 3,
some times 5;calyx usually not conspicuously
inflated;petal conspicuous:

6a. Seed crested on the dorsal surface
.....Heliosperma

6b. Seed not crested on the dorsal surface
..... Silene

Ib. Fruit berry-like
.....Cucubalus

DESCRIPTIONS

Measurements of the parts :- All measurements have been made on dried material with exception of those of calyx,petal, style and anthophore which were made after the flowers were boiled in water.As the fully mature capsule dehisces on drying, the capsules measured on dry herbarium specimens are not only slightly immature but must have shrunk a little in drying. Measurements of the different parts of the plants that appear in the description of species are given in the metric system.In expressing the average height of the plant,I have taken the measurements from the base of stem right upto the base of the remotest flower; the width or diameter of the parts is taken from the widest part of the organ concerned,while that of the lamina from that part immediately below the incision.The length of the anthophore is always taken from boiled flowers and not from the fruit. In the case of seed,the measurement has been taken in the largest part along the tangential dimension,and in the dried state.Lastly,the altitude of the locality from which the specimens were collected has been expressed in meters.

Specific descriptions,etc. :- The matter under this heading are arranged as follows -

I. The name of the species- the name of the species is followed by the authority for the name,and the book or periodical in which it was first published.References are also given to some valuable works, especially Boissier's Flora Orientalis; Rohrbach's Monographie der Gattung Silene; F.N.William's Revision of the

genus Silene and Post's Flora of Syria,Palestine and Sinai.This is followed by a reference to one or two good figures.

2.Synonyms - I have tried to present a list of synonyms as far as practicable for the species.In doing so, I had to face some difficulty: the types of the synonyms were not always available, so that synonym is often based on the original descriptions alone.Synonyms are cited in chronological order, with the author's name,the date and the name of publication.

3.Description - the description of all the species described in this work are based on material from the Oriental Countries,specimens from adjacent countries not being included. The description of each species is followed by the life form which the taxon is believed to possess.For subspecies and varieties I have added the necessary description.The description of the new species and subspecies is supplemented by figures and plates.A few figures of the species already described have also been added.

4.Type - whenever possible,I have examined type material and have cited the type locality exactly as published for the species.I have also indicated the herbarium or museum where the holotype is believed to be, with a sign of exclamation if personally seen.Isotypes,lectotypes and syntypes are similarly indicated.

5.Citation of specimens - here I have tried to indicate as far as practicable the geographical distribution of the species within the Orient. The country, province,district and the locality of collection are given,whereever possible,from the label, this

being followed by the date of collection, collector's name and number of the specimen

6.Geographical distribution (out side the Orient) - geographical distribution of the species has been given at the end of the citation of the specimens.In the case of species of wide distribution out side the Orient,I have proposed to mention all the countries.

7.Ecology - I have not attempted to show the ecological relation of the species,but I have given the ecological data for each species in a condensed form based on the labels of specimens.

8.Discussion or notes - the last item under the heading of each species contains a brief discussion on the species which is usually meant to indicate its relationship with other species and its endemism if there be any.

Abbreviations used in the work :-

I. Life form -The Danish Botanist Raunkiaer classified plants according to the position of the resting bud during the unfavourable season.The major life forms have been subdivided into the smaller units.Of these various life forms recognized by Clapham,I shall mention here only those which I have frequently used in the present work :-

1. Chamaephytes -woody or herbaceous plants with buds above the soil level but below 25 cm.→Ch

   a. Woody chamaephytes-- Chw

   b. Herbaceous " -- Chh

   c. Cushion " -- Chc

ii. Hemicryptophytes - herbs with the buds in the surface of the soil

a. Protohemicryptophytes with uniformly leafy stems, but the basal leaves usually smaller than the rest -- Hp

b. Semi rosette hemicryptophytes with leafy stems, but the lower leaves larger than the upper ones -- Hs

c. Rosette hemicryptophytes with more or less leafless stems with a rosette of basal leaves -- Hr

iii. Therophytes -plants which pass the unfavourable season as seeds. -- Th

2. Herbaria - The herbaria where the type species are supposed to be are indicated by the following abbreviations :-

BM = Herbarium,British Museum (Natural History), London

DH = De Candolle Herbarium,Conservatoire et Jardin Botaniques,Geneva.

E = Herbarium,Royal Botanic Garden,Edinburgh,UK.

G = Herbarium Boissier,Université de Geneve, Switzerland.

K = Herbarium,Royal Botanic Garden,Kew;UK.

L = Linnaean Herbarium,Linnaean Society,Burlington House, London;UK.

P = Herbarium,Museum d'Histoire Naturelle, Paris,France

DIAGNOSIS AND DESCRIPTION OF THE GENUS

Silene Linn.,Sp.Pl.,ed.I,416 (1753);Gen.Pl.,ed.5,193 (1754); Otth in DC.,Prodr.,i,367 (1824);Benth. & Hook.,Gen.Pl.,i,147 (1862); Boiss.,Fl.Or.,i,567 (1867);Rohrb.,Monogr. der Gat.Sil. (1868);F.N. Williams, Rev.Gen. Sil. Journ.Linn. Soc.,xxxii,I (1896);Post,Fl. Syr. Pal. & Sinai,i,169 (1932);Hayek,Prodr.Fl.Pen. Balc.i,255 (1927).

Synonyms

Viscago Hall.,Enum.Strip.Helv.,i,373(1742);Moench,Method., 704 (1794);non Koch,Syn.,ed.I,106(1836).

Muscipula Hall. in Rupp.,Fl.Jen.,ed.3,125 (1745).

Atocion Adans., Fam.Pl.,ii,254 (1763);Raf.,Aut.Bot.,28 (1840).

Kaleria Adans., Fam.Pl.,ii,506 (1763).

Oberna Adans., Fam.Pl.,ii,255 (1763);Raf.,Aut.Bot.,25(1840).

Otites Adans., Fam.Pl.,ii,255 (1763);Raf.,Aut.Bot.,25(1840).

Behen Moench,Method.,709 (1794).

Ebraxis Raf.,Aut.Bot.,29 (1840).

Pleconax Raf., ibid., 24 (1840).

Xamilenis Raf., ibid., 24 (1840).

Evactoma Raf., ibid., 23 (1840).

Corone Hoffmg. ex Steud.,Nom.Bot.,ed.II,i,422 (1840).

Diplogama Opiz,Seznam, 38 (1852).

Silenanthe Griseb. et Schenk. in Wiegm.Arch.Nat.xviii,I. 300 (1852).

Oncerum Dulac,Fl.Hautes-Pyr. 255 (1867).

Leptosilene Fourr. in Ann.Soc.Linn.Lyon Nouv. Ser. xvi, 344 (1868).

Petrosilene Fourr. ibid., 344 (1868).

Petrocoma Rupr.,Fl. Cauc. 200 (1869).

Physolychnis Rupr.in Mem.Nr.4.Acad.St.Petersb.7.Ser.xiv. 41 (1869).

Behenantha Schur in Verh.Nat. Ver. Brunn,xv,II,130(1877).

Cheiropetalum Fries,Index Sem. Hort.Upsal.(1857) ex Urban,Addit. Index Sem. Hort. Berol.II (1881).

Anotites Greene,Leaflet Bot.Obs. i,97 (1905).

Original Description *

372 Silene Linn. Gen.Pl.,ed.I,132 (1737).

Calyx - Perianthium monophyllum,clavatum,leve,5-dentatum, persistens.

Corolla - Petala 5. Ungues angusti,longitudine calycis, marginati.Limbus planus,obtusus,emarginatus.Nectarium componitur e duobus denticulis,in collo cujusvis petali.

Stamina - Filamenta 10,subulata,alterna, unguibus petalorum inserta,seriora. Antherae oblongae.

Pistillum - Ovarium cylindraceum.Styli 3 vel 5, simplices, staminibus longiores.Stigmata contra solem flexa.

Pericarpium - Capsula cylindracea,tecta,3-5-locularis apice 6-fariam dehiscens.

Semina - plurima,reniformia.

Expanded Description

Annuals or biennials,or herbaceous,suffruticose,

* With the verbal emendations of Richter's 'Codex Linneanus'.

often caespitose perennials.Root usually deep-seated,vertical, slender or stout,usually tapering, sometimes fusciform,branched or simple,in perennials usually with a multicipital crown.Caudex short or long,slender or stout, woody in perennial species,branched or simple, erect,ascending,sometimes prostrate or procumbent,in plants more than I-year old bearing leaf scars and bases of old petioles.Stems solitary or few to many,erect,ascending or prostrate, usually branched,sometimes simple,glabrous or variously puberulent and glandular,usually viscid above;branching dichotomous,dichasial or paniculately racemose.Leaves entire,exstipulate,opposite,thin, sometimes fleshy,ovate,ovate-lanceolate,lanceolate,linear, linear-subulate,sometimes triquetrous, I- or 3-5-nerved,acute, acuminate or obtuse, sometimes indurate and pointed, seldom rounded or mucrunate,margins smooth or ciliate;caudical leaves usually large,rosulate,tapering into long or short petioles,the base with membraneous and expanded margins uniting into pairs and forming a sheath;cauline leaves usually smaller,sessile,sometimes some what bigger than the caudical leaves, or reduced,remote and bract-like. Inflorescence racemosely paniculate, or simple or compound dichasium or monochasium, sometimes condensed into an apparent verticellaster or capitate cyme,or even reduced to a few flowered cyme or single flower. Bracts and bracteoles equal or unequal,herbaceous,scarious, I- or 3-5-nerved at the base,with hyaline ciliate margin,shape various.Flowers pentamerous,hermaphrodite,or sometimes unisexual, monoecious or dioecious or polygamous,pedicellate,erect or nodding. Calyx gamosepalous,tubular,tubular-clavate,or clavate to campanulate,sometimes inflated,membraneous or firm or coriaceous,

glabrous or variously pubescent and glandular,10-20-30- or 60-nerved,nerves usually reticulately anastomosed,sometimes simple, 5-toothed,in fruit often with a constriction below the capsule & with the apex contracted,base umbilicate or truncate.Petal free, with a distinct claw and limb,white or pink or yellowish;claw narrow,membraneous margined,with three nerves,usually expanded above,often auriculate,smooth or ciliate,often with a pair of ligules(of various shape) at the juncture of claw & limb on the ventral surface;limb conspicuous,exserted,oblong,obovate,obcordate, cuneate or elliptical,entire or bilobed,sometimes fimbriate.Stamens 10,usually dimorphic,longer ones opposite the petals;filaments slender,smooth or puberulent.Carpels usually 3,sometimes 4-5, syncarpous;the ovary with a stipe (anthophore) which also bears the stamens and petals.Styles correspond to the number of carpels, free,exserted or included,usually puberulent.Capsule ovoid,ovoid-oblong,ovoid-conical,oblong-ovoid or subglobose,many-seeded (rarely 1-2-seeded & indehiscent),included within the calyx or conspicuously exserted,dehiscing by 6 or 8-10 more or less equal teeth.Seed reniform to subglobose,sometimes compressed;face smooth or striate or tuberculate,flat ,convex or concave;back flat,or convex,or concave,or grooved,sometimes with two wavy wings.

As certain morphological terms in connection with the floral structure have been frequently used in this taxonomic paper,I have exemplified them by figures:-

Auricles- When present,these are found on both sides of the claw at its upper end.In most species of Silene the petal claw is expanded above,and at its apex,on both sides,the two free margins often project beyond the point of union of limb & claw.

These free lateral projections are termed auricles.The auricle is often angular at the apex;when the angle is small,the claw is called acutely auriculate,when large,obtusely auriculate.Sometimes auricles are rounded or more or less obscure.When auricles are absent the petal is called exauriculate [fig.2a]

Anthophore- In the flower of Silene there is a stalk-like portion which lies between the point of union of calyx and pedicel and the base of petals (with stamens and ovary).The internode of the floral axis between calyx and corolla is elongated and is termed as the anthophore.In previous revisions this was named carpo--phore,which is a misleading term.The term anthophore is adopted throughout my work . [fig.2b]

Ligules- These are erect appendages at the juncture of the claw and limb of the petal;the ligules together are known as the corona.When the ligule is present,the petal is called ligulate; when absent it is termed as eligulate.Ligules are of various shape and usually two per petal [fig.2c]

Umbilicate- A round navel-like depression at the base of the calyx,developing at the point of attachment to the pedicel. When the calyx has such a depression,it is called umbilicate.In the section Sclerocalycinae,the calyx possesses a ring-like structure at the base,round the pedicel;such a calyx is termed pseudo-umbilicate [fig.2d]

Fig.2

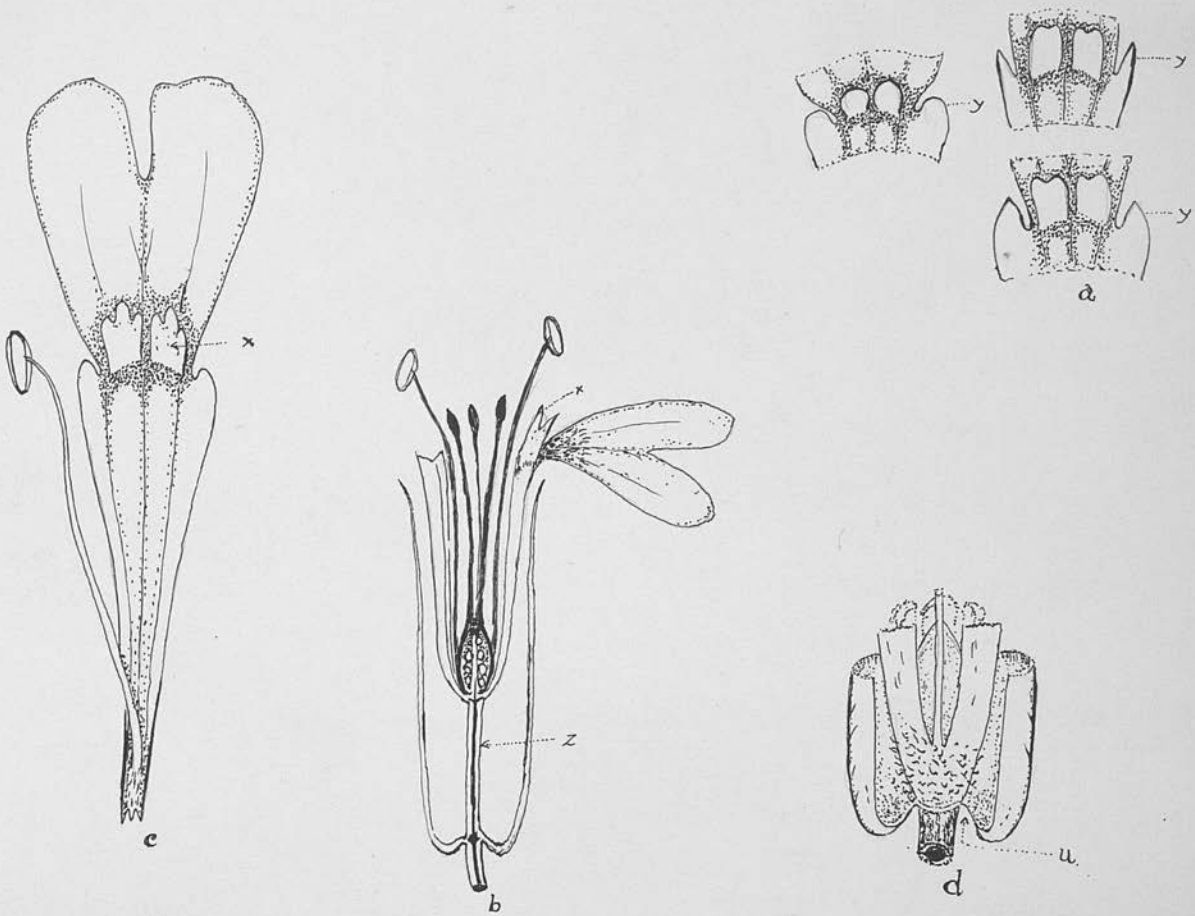


Fig.2. Parts of a flower: a.-different types of auricles(y); b.-flower cut longitudinally showing anthophore (z)and other parts;c.-ligules (x);d.-calyx with umbilicate base (u)[a portion of calyx taken out]

DIAGNOSES OF THE SECTIONS

Section I. Paniculatae Boiss.,Fl. Or.,i,574 (1867).

Syn. Series Italicae Rohrb.,Monogr.Sil.,77(1868).

Perennial herbs,pubescent,glandular-puberulent sometimes hirsute,often viscid,rarely glabrescent or glabrous.Caudex woody, short and thick or slender and long,becoming branched and suffruticose,leafy,I-several-stemmed.Stem erect or ascending,usually branched from above middle or in the region of inflorescence (sometimes throughout),leafy.Caudical and lower cauline leaves large,rosulate,petiolate,linear-lanceolate to oblong-lanceolate or ovate to ovate-lanceolate;other cauline leaves similar,sessile gradually reduced upwards,sometimes much reduced and remote,seldom conspicuous and large,numerous,with short sterile leafy shoots in axils.Inflorescence a panicle,lax or more or less congested;axis long;cymules opposite,spreading or ascending,3-5-or 7(rarely I)-flowered;rarely plants few- I-flowered.Flowers hermaphrodite,large, erect at anthesis,pedicellate.Calyx membraneous,tubular-clavate or clavate,pubescent or glandular-puberulent,often viscid;in fruit clavate ,usually with a constriction below the capsule.Petals white or pink,ligulate;limb usually bipartite,seldom laciniate, entire or emarginate;claw smooth seldom ciliate,rarely auriculate. Filaments smooth.Capsule ovoid or ovoid-oblong,stipitate,included. Seed with flat face and grooved back.Type species:S.italica(L.)Pers.

Subsection Ia. Patulae Chowdhuri,subsect.nov.

Caules 30.0 -I00.0 cm. alti,tenues vel crassiusculi, superne vel in regione inflorescentiae paniculati.Folia caudicalia

et caulina inferiora magna,rosulata,petiolata;caulina altera sessilia gradatim reducta,raro numerosa,conspicua,fasciculata,interdum superiora pauca,parva.Petala bipartita,ligulata;ungues glabri raro ciliatuli et auriculati.Capsula ovoideo-oblonga

Type species: S.italica(Linn.)Pers.

S.splendens Boiss.
S.italica (L.)Pers.
S.pseudo-nutans Panc.
S.spinescens Sibth. & Sm.
S.Sieberi Fenzl
S.Schwarzenbergeri Halacsy
S.Fenzlii Boiss.& Bal.
S.nevadensis Boiss.
S.rhodopea Janka
S.phrygia Boiss.
S.pauciflora Salzm.
S.Salzmanni Badaro
S.fruticosa Linn.
S.rosulata Soy-W.& Godr.
S.mollissima Pers.
S.gibraltarica Boiss.
S.hifacensis Rouy
S.paradoxa Linn.
S.gigantea Linn.

Distr: Mediterranean, S.E. Europe.

Subsection Ib. Sclerophyllae Chowdhuri,subsect.nov.

Caules 20.0 -60.0 cm. alti,tenues,glaberrimi raro puberuli,simplices vel sparsim ramosi;ramis paucis,elongatis.Folia monomorphica,coriacea,caudicalia plus minus parva;caulina plerumque numerosa,conspicua, rare fasciculata.Petala integra vel emarginata;ungues glabri,exauriculati.Capsula ovoidea.

Type species : S.Alexandri Hillebrand

S.lanceolata Gray
S.Tankae Maxim.
S.Alexandri Hillebrand
S.japonica Rohrb.
S.struthioloides Gray

Distr. Japan & Hawaian Is.

Subsection Ic. Laciniatae (Boiss.) Chowdhuri,comb.et stat.nov.

Syn. Sect.Laciniatae Boiss.,Fl.Or.,i,575(1867).

Stem branched from the base upwards,rarely simple, puberulent,becoming glabrous above.Leaves monomorphic,linear or linear-lanceolate,sometimes ovate or ovate-lanceolate,gradually reduced upwards.Petals eligulate (except S.anisoloba Schrenk); limb 4-many-partite;claw smooth,exauriculate.Capsule ovoid-oblong

Type species: S.odoratissima Bunge

S.odoratissima Bunge
S.anisoloba Schrenk
S.Olgiana B.Fedtsch
S.ovata Pursh
S.Fortunei Vis.

Distr. Siberia, China & N. America.

Section 2. Occidentales Chowdhuri,sect. nov.

Herbae perennes,pubescentes,glanduloso- vel hirtello-pubescentes.Radix lignosa,tenuis vel crassa,elongata,multiceps. Caudex lignosus,tenuus vel crassiusculus,foliosus,ramosus.Caules elati,erecti,ascendenti-erecti vel ascendenti,foliosi,ramosi,saepe subsimplices.Folia caudicalia rosulata,petiolata;folia caulina conspicua,superne gradatim reducta;omnia magna,rotundata,ovata, ovato-lanceolata,lanceolata vel oblanceolata raro linearia plerumque uninervia.Inflorescentia racemoso-paniculata.Flores hermaphroditi,erecti,pedicellati.Calyx membranaceus,late cylindricus raro tubuloso-campanulatus,glanduloso-puberulus. Petala plerumque multipartita raro bipartita vel integra;unguis ciliolatus,auriculatus interdum glaber et exauriculatus.Filamenta glabra vel pilosa.Styli 3-4 (5).Capsula ovoidea vel conico-ovoidea, stipitata,calyce inclusa.Semina forma variantia.

Type species: S. montana Wats.

S.regia Sims

S.subciliata Robinson

S.verecunda Wats.
S.Spaldingii Wats.
S.nuda (Wats.)H.& M.
S.Lemmonii Wats.
S.oregana Wats.
S.montana Wats.

S.rotundifolia Nutt.
S.virginica Linn.
S.californica Durand
S.laciniata Cav.
S.dumicola W.W.Sm.
S.occidentalis Wats.
S.praticola W.W.Sm.

Dict. N. America & China.

Siphonomorpha Otth. in DC. Prodr. i, ——

Section β. Viridiflorae Boiss., Fl.Or., i, 574 (1867). Syn.

Syn. Series Nutantes Rohrb., Monogr.Sil., 76 (1868).

Genus Evactoma Raf., Aut.Bot., 23 (1840).

Perennial herbs, pubescent or tomentose, sometimes glandular-puberulent, often viscid above, rarely glabrescent. Caudex short, leafy, 1-few-stemmed, often suffruticose at the base. Stem erect, simple below, branched from middle upwards especially in the region of inflorescence. Caudical leaves rosulate, petiolate, oblong- or lanceolate- spathulate rarely linear-lanceolate; cauline leaves sessile, usually reduced rarely conspicuous with short sterile leafy shoots in axils. Inflorescence a panicle; cymules opposite, ascending, 3-5 or 7 (rarely 1)-flowered. Flowers hermaphrodite, large, nodding at anthesis. Calyx tubular-clavate or clavate, membraneous, pubescent or glandular-puberulent, sometimes glabrous, often viscid, in fruit clavate with a constriction below the capsule and apex more or less contracted. Petals usually white, bipartite rarely multipartite, mostly ligulate; claw smooth, exauriculate. Filaments smooth. Capsule ovoid-conical, stipitate, included. Seed with flat face and grooved back. ~~Type species: S.viridiflora Linn.~~ Lectotype ! nutans Linn.

S.leucophylla Boiss.
S.amana Boiss.

S.viridiflora Linn.
S.mellifera Boiss.& Reut.
S.catholica Ait.
S.nivea Otth
S.stellata Ait.
S.nutans Linn.
S.longicilia Otth
S.velutinoides Pomel
S.otodonta Franch.
S.galataea Boiss.
S.epilosa W.W.Sm.

Distr. W. & S. Mediterranean, Siberia, China & N. America

Section 4. Lasiostemones Boiss.,Fl.Or.,i,574 (1867);Rohrb., Monogr. Sil.,76 (1868).

Perennial herbs,puberulent or scabrous below,becoming glabrous and seldom viscid above.Caudex woody,simple or branched, leafy,1-few-stemmed.Stem usually simple below,becoming branched from middle upwards.Caudical leaves rosulate,petiolate,linear- or oblong-lanceolate;cauline leaves usually reduced,sometimes conspicuous,gradually reduced upwards,seldom fasciculate. Inflorescence a panicle;cymules long,spreading or ascending, 3-5-or 7-flowered,rarely cymules short,1-2-flowered(S.olympica Boiss. and S.saxatilis Sims).Flowers hermaphrodite,rather small, pedicellate,erect or nodding at anthesis.Calyx obconical,often more or less firm,glabrous,very rarely scabrous at the nerves. Petals white or pinkish,bipartite rarely laciniate,usually ligulate; claw ciliate,often minutely auriculate.Filaments pilose at the base (except S.parrowiana Boiss. and S.Manissadjiani Freyn). Capsule ovoid,shortly stipitate,included or variously exserted. Seed with flat face and grooved back.

Lectotype Type species :S.longipetala Vent.

S.affghanica Rohrb.
S.puberula Boiss.

S.parrowiana Boiss. S.Marschalli C.A.Mey

S.Manissadjiani Freyn S.saxatilis Sims

S.olympica Boiss. S.kunawurensis Royle

S.Niederi Heldr. S.Ruprechtii Schischkin

S.longipetala Vent. S.aprica Turcz.

Distr. S.E. Europe, Orient, Russia to Japan.

Section 5. Sclerocalycinae Boiss.,Fl.Or.,i,575 (1867);Rohrb., Monogr. Sil.,73 (1868).

Perennial herbs,usually glabrous,often glaucescent, seldom puberulent below,becoming glabrous above.Caudex woody, sometimes leafy,becoming branched and suffruticose,1-many-stemmed. Stem erect or ascending,usually simple below,becoming branched above,sometimes branched from the base upwards,rarely simple throughout.Caudical and lower cauline leaves large,petiolate, rosulate,other cauline leaves reduced,sessile,often remote; sometimes caudical and lower cauline leaves small,persistent or ephemeral and other cauline leaves gradually increasing,reaching maximum size near or at the middle region,upper gradually reduced. Inflorescence a panicle;branches opposite rarely alternate, ascending,3-5-or 7(rarely 1)-flowered,sometimes plants 1-2-flowered. Flowers hermaphrodite,very rarely unisexual by abortion,large, pedicellate,usually erect at anthesis (except S.libanotica Boiss.). Calyx coriaceous,tubular-clavate or clavate,glabrous, base pseudo-umbilicate with an annular ring;usually with alternating acute and obtuse teeth.Petals white,sometimes pink,rarely yellowish, bipartite;ligules conspicuous or minute,sometimes absent;claw smooth,exauriculate.Filaments smooth.Capsule oblong,stipitate, included or some what exserted.Seed with flat face and grooved

back. Lectotype Type species : S.longiflora Ehrh.

Subsection 5a. Longiflorae Schischkin ex Chowdhuri .

Syn. Sect. Sclerocalycinae subsect.Longiflorae Schischkin in Komarov,Fl. U. R. S. S.,vi,636 (I936)- descr. russ.

Folia caudicalia et caulina inferiora numerosa,rosularia, linearia vel lineari-lanceolata;folia caulina superiora similia, pauca,gradatim reducta,rare parva,remota,bracteiformia.Caules plerumque superne vel in regione inflorescentiae ramosi (rare e basi ramosi -S.longiflora Ehrh. subsp. ramosa Chowdhuri).Planta glabra, rare inferne puberula.

Type species : S.longiflora Ehrh.

S.longiflora Ehrh. S.armena Boiss.
S.caramanica Boiss. S.Balansa Boiss.
S.macrosolen Steud. S.serrulata Boiss.
S.Rouyana Battand. S.lycica Chowdhuri
S.peduncularis Boiss.

D.G. S.E. Europe (Russia), Orient & N. Africa.

Subsection 5b. Chlorifoliae Schischkin ex Chowdhuri.

Syn. Sect. Sclerocalycinae subsect. Chlorifoliae Schischkin in Komarov,Fl. U. R. S. S.,vi,636 (I936)- descr. russ.

Folia caudicalia et caulina inferiora parva,rosularia, sub anthesi emarcida,caulina alterna gradatim sursum increscentia, superne gradatim reducta, ovata, lanceolata vel lineari-lanceolata, acuta vel acuminata.Caules ramosi,rarius simplices.Planta glabra.

Type species: S.chlorifolia Sm.

S.chlorifolia Sm. S.laxa Boiss. & Ky.
S.swertiifolia Boiss. S.caesarea Boiss. & Bal.

S.sclerophylla Chowdhuri
S.Schimperiana Boiss.
S.sclerophylloides Chowdhuri
S.Haradjianii Chowdhuri
S.libanotica Boiss.
S.makmeliana Boiss.
S.obtusidentata B.Fedtsch

Dist. Orient & Caucasus.

Section 6. Tunicoideae Boiss.,Fl. Or.,i,577 (1867).

Perennial herb,canescent and puberulent.Caudex slender, woody,branched,I-few-stemmed.Stem erect,tall,branched,leafy;branches slender.Leaves monomorphic,linear-subulate,serrate-scabrous,cauline leaves numerous,conspicuous,fasciculate.Inflorescence a panicle, few-flowered;branches of the panicle often alternate,strict, I-3-flowered.Flowers hermaphrodite,small,with long slender or filiform pedicels.Calyx 3.0 -4.5 mm. long,ovate,subcoriaceous. Petals greenish,eligulate,entire;claw smooth,exauriculate.Filaments smooth.Capsule oblong-ovoid.Type species:S.tunicoides Boiss.

Dist. Greece & Turkey.

~~S.tunicoides Boiss.~~

Section 7. Chloranthae Rohrb.,Monogr. Sil.,74 (1868);Williams in Journ. Linn. Soc.,xxxii,34 (1896);Schischkin in Komarov,Fl.U.R. S.S.,vi,616 (1936).

Perennial herbs,glabrescent,or more or less puberulent below.Caudex woody,leafy,simple or furcate,I-few-stemmed.Stem erect,simple or branched in the region of inflorescence.Caudical & lower cauline leaves large,rosulate,petiolate,lanceolate or spathulate-obovate;other cauline leaves reduced,often remote, usually bract-like.Inflorescence raceme-like;main axis usually

long,sometimes some what short;lateral cymules opposite,short, I-3-flowered,lower I-3 or 4 pairs long,3-5- or 7-flowered, sometimes all I-2-flowered.Flowers hermaphrodite,erect,pedicellate. Calyx oblong-clavate or clavate,sometimes tubular-clavate,glabrous or scabrous.Petals white or yellowish rarely pinkish,eligulate, (sometimes ligulate),bipartite;claw exauriculate,usually smooth (except S.radicosa Boiss.& Heldr.).Capsule oblong,stipitate,usually some what exserted.Seed with flat face and grooved back.

Type species :S.chlorantha (W.) Ehrh.

Subsection 7a. Ecoronatae Schischkin ex Chowdhuri.

Syn. Sect.Chloranthae subsect. Ecoronatae Schischkin in Komarov, Fl. U. R. S. S.,vi,616 (1936).

Folia caudicalia et caulina inferiora ampla,rosulata, lanceolato-spathulata;folia caulina altera sessilia,pauca,remota, plerumque parva,bracteiformia.Inflorescentia racemiformis,elongata, multiflora;cymulis I-3 (5) floris,inferioribus longis.Calyx oblongo-clavatus vel clavatus;nervis anastomosantibus,haud prominentibus, inter nervis haud sulcatis.Petala eligulata.Capsula oblonga.

Type species : S.chlorantha (W.)Ehrh.

S.Friwaldzkyana Hampe S.chlorantha (W.)Ehrh.

S.multiflora (W.& K.)Pers. S.viscosa (Linn.)Pers.

Dist. S.E. Europe extending to Turkey and India.

Subsection 7b. Coronatae Chowdhuri,subsect. nov.

Folia caudicalia et caulina inferiora rosulata,obovato- vel lanceolato-spathulata;folia caulina altera pauca,linearia. Inflorescentia racemiformis,pauciflora;flores in cymulos I-3-floros dispositi.Flores hermaphroditi.Calyx clavatus;nervis IO plus

minus crassis,prominentibus provisus,inter nervis saepe subsulcatis. Petala ligulata.Capsula ovoideo-oblonga.

Type species :S.Reichenbachii Vis.

S.Reichenbachii Vis. S.radicosa Boiss. & Heldr.

S.lyconica Chowdhuri S.oligantha Boiss. & Heldr.

S.genistifolia Halacsy

Distr. Greece & Turkey.

Section 8. Tataricae (Schischkin) Chowdhuri,comb. et stat. nov.

Syn. Sect. Chloranthae subsect.Tataricae Schischkin in Komarov, Fl. U. R. S. S.,vi, 619 (1936).

Herbae perennes,pubescentes vel glabrescentes.Radix lignosa,elongata.Caudex lignosus,simplex vel furcatus.Caules elati, simplices vel raro superne sparsim ramosi.Folia monomorphica, linearia vel lineari-lanceolata vel oblongo-lanceolata;folia caulina numerosa,conspicua,fasciculata.Inflorescentia racemiformis; cymuli breves,oppositi,inferiores 3-5- vel 7-flori,superiores I(2-3)-flori.Flores hermaphroditi,pedicellati,erecti.Calyx oblongo-clavatus,raro subampliatus,in fructu clavatus infra capsulam leviter constrictus.Petala alba,bipartita,ligulata;ungues et filamenta glabri.Capsula oblonga.Semina dorso canaliculata,faciebus plana.

Type species : S.tatarica Pers.

S.tatarica Pers. S.praemixta M.Pop.

S.chloropetala Rupr. S.eremitica Boiss.

S.macrostyla Maxim. S.Skorpili Velen.

S.foliosa Maxim.

Distr. Siberia extending S.W. to Bulgaria, Turkey & N. Persia.

Section 9. Graminifoliae (Schischkin ex) Chowdhuri,comb. et stat. nov.

Sect. Gastrolychnis (Fenzl) Chowdhuri, comb. nov.

Syn. Lychnis sect. Gastrolychnis Fenzl in Endl., Gen. Pl., 974 (1840)

Wahlbergella Fries in Bot. Notiser 1843: 143 (1843).

Gastrolychnis (Fenzl) Rupr. in Beitr. Pflanzenk. russ. Reich. ii, 24 (1845); Reichb. in Heynhold, Nomencl. Bot., ii, 225 (1846).

Melandrium sect. Wahlbergella (Fries) Boiss., Fl. Or., i, 661 (1867)

Wahlenbergella Blytt, Norges Fl., iii, 1070 (1876)

Melandrium sect. Gastrolychnis (Fenzl) Lax in E. & P., Nat. Pflanzenf. i, Abth. iii, i, 76 (1889)

Melandrium subgen. Gastrolychnis (Fenzl) Schischkin in Kom., Fl. U.R.S.S., vi, 714 (1936)

Lecto type. – Silene Wahlbergella Chowdhuri ~~non nov.~~

Distr. Europe, Asia & N. America

Syn. Sect.Chloranthae subsect.Graminifoliae Schischkin in Komarov, Fl.U. R. S. S.,vi, 625 (1936).– Leser. russ.

Herbae perennes,caespitosae,pubescentes vel glabrescentes. Caudex simplex vel ramosus,foliosus,lignosus,tenuis vel crassiusculus.Caules erecti vel ascendenti-erecti,foliosi,superne paullum ramosi.Folia caudicalia numerosa,magna,rosulata,petiolata vel subsessilia,lanceolata vel lineari-lanceolata;folia caulina pauca,gradatim reducta vel bracteiformia.Inflorescentia racemiformis,plus minus brevis;cymulis oppositis,1-2-floris.Flores hermaphroditi,fere subnutantes.Calyx membranaceus,campanulatus raro tubuloso-campanulatus.Petala bipartita,ligulata;lobis interdum emarginatis;unguis plerumque ciliolatus et exauriculatus.Filamenta glabra.Styli 3-4-(5).Capsula ovoidea vel conico-ovoidea,stipitata, calyce inclusa.Semina dorso canaliculata,faciebus plana.

Type species : S.tenuis Willd.

S.tenuis Willd.	S.Douglasii Hook.
S.Jenisseensis Willd.	S.Macounii Wats.
S.chamarensis Turcz.	S.Parryi (Wats.) H.& M.
S.Drummondii Hook.	S.Bridgesii Rohrb.
S.scaposa Robinson	S.Schunglienensis W.W.Sm.
S.Scouleri Hook.	

insert Saer. Gastrolychnis.

Otites Oth. in DC. Prodr. i, ---- / Syn. (new)

Section ~~IO.~~ Otiteae Boiss.,Fl.Or.,i,571 (1867);Rohrb.,Monogr. Sil., 75 (1868).

Perennial herbs,usually pubescent below,glabrous and viscid above.Caudex usually stout,sometimes slender,woody,simple or branched,leafy.Stem tall,usually simple below,becoming sparingly

branched above, sometimes simple throughout.Caudical and lower cauline leaves large,petiolate,rosulate,lanceolate-spathulate, sometimes linear-lanceolate;other cauline leaves gradually reduced upwards,sometimes more or less fasciculate,seldom abruptly reduced and bract-like.Inflorescence with simple or branched axis;lateral cymules short bearing clusters of flowers at the nodes in apparent verticillasters;rarely main axis very much condensed bearing flowers in a capitate cyme.Flowers small, unisexual,very rarely hermaphrodite,pedicellate,sometimes subsessile.Calyx obconical or campanulate,adpressed in fruit.Petals yellowish,rarely white, eligulate,entire or emarginate.Filaments smooth.Capsule ovoid-oblong, subsessile,included.Seed with flat face and grooved back.

Lectotype
Type species :S.Otites (Linn.) Sm.

S.Otites (Linn.)Sm.	S.ventricosa Adam.
S.Cyri Schischkin	S.Roemeri Friv.
S.Hellmanni Claus.	S.Sendtneri Boiss.
S.media (Litw.)Kleop.	S.capitellata Boiss.

Distr. S. & S.E. Europe, Orient.

Section Holopetalae Schischkin ex Chowdhuri .

Syn. Sect.Holopetalae Schischkin in Komarov,Fl. U. R. S. S.,vi, 676 (1936).

Herbae perennes,pubescentes vel puberulentes.Radix lignosa,elongata.Caudex brevis,erectus,simplex vel furcatus,foliatus. Caules elati,foliosi,simplices vel superne sparsim ramosi.Folia monomorphica,lineari-oblonga vel ovato-lanceolata;folia caulina numerosa,conspicua,fasciculata,superne gradatim reducta.Inflorescentia simplex vel ramosa,e cymulis congestis (inter se distantibus)

breviter pedunculatis composita.Flores dioici,pedicellati, rarius hermaphroditi,erecti.Calyx tubuloso-clavatus,in fructu ovatus, interdum plus minus subinflatus.Petala alba (rare purpurescentia), integra vel emarginata,plerumque eligulata;ungues et filamenta glabri.Capsula plerumque ovoidea,breviter stipitata,calyce inclusa. Semina dorso canaliculata,faciebus plana.

Type species : S.holopetala Bunge

Subsection ~~IIa.~~ Sibiricae Schischkin ex Chowdhuri.

Syn. Sect.Holopetalae subsect. Sibiricae Schischkin in Komarov, Fl. U. R. S. S.,vi, 676 (1936).

Folia omnia linearia vel lineari-oblonga.Petala alba, eligulata.Flores dioici.Caules plerumque simplices.

Type species : S.sibirica (Linn.)Pers.

S.sibirica (Linn.)Pers. S.holopetala Bunge

S.Falconeriana Royle S.Gebleriana Schrenk

Subsection ~~IIb.~~ Ligulatae Chowdhuri,subsect. nov.

Folia ovato-lanceolata vel lanceolata.Petala purpurea, ligulata.Flores hermaphroditi.Caules sparse ramosi.

Type species : S.confertiflora Chowdhuri

~~S.confertiflora Chowdhuri~~

Section ~~IIa.~~ Spergulifoliae Boiss.,Fl.Or.,i,572 (1867);Rohrb., Monogr. Sil.,72 (1868).

Perennial herbs,caespitose,sometimes with a suffruticose base,pubescent or glandular-puberulent,often viscid above.Caudex slender,long, sometimes short,branched,woody or herbaceous.Stem

simple below,branched above,leafy.Leaves monomorphic;caudical & lower cauline leaves rosulate, small,often disappearing from the old plants;cauline leaves many,conspicuous,sometimes fasciculate, linear,linear-lanceolate or lanceolate.Inflorescence a panicle; cymules opposite or alternate,strict,erect,1-3- or 5-flowered. Flowers hermaphrodite or unisexual (dioecious),sessile or subsessile, crowded at the apices of cymules.Calyx tubular-clavate or oblong-clavate,often more or less inflated at or after anthesis.Petals yellowish-white,bipartite,ligulate;claw usually smooth & exauriculate. Filaments smooth.Capsule ovoid-conical,sometimes trisulcate, stipitate,included.Seed with flat face and grooved back.

Lectotype
Type species : S.spergulifolia(Desf.) M.B.

Subsection ~~18a.~~ Polyphyllae Schischkin ex Chowdhuri.

Syn. Sect.Spergulifoliae subsect.Polyphyllae Schischkin in Komarov,Fl.U. R. S. S.,vi,652 (1936).— descr. russ.

Caules suffrutescentes,stricti,ramosi.Folia linearia, acuminata,plerumque recurva et fasciculata.Flores hermaphroditi, raro dioici.Calyx vix inflatus.Ungues petalorum ciliatuli.Capsula ovoideo-conica haud trisulca.

Type species :S.spergulifolia (Desf.)M.B.

S.spergulifolia (Desf.)M.B.

S.stenobotrys Boiss.& Hausskn.

S.armeniaca Rohrb.

Distr. Orient ad Caucasus

Subsection ~~18b.~~ Repentes Schischkin ex Chowdhuri.

Syn. Sect.Spergulifoliae subsect. Repentes Schischkin in Komarov,Fl. U. R. S. S.,vi,654 (1936).

Caules herbacei,ramosi vel simplices,erecti.Folia

lanceolata vix fasciculata.Flores hermaphroditi vel dioici.Calyx plus minus inflatus.Ungues petalorum glabri.Capsula ovoideo-conica, haud trisulca.

Type species :S.repensPatrin.

S.repens Patrin.

S.cephalantha Boiss.

Dist. Orient, Sibiria, China & N. America.

Subsection ~~Tic.~~ Olgae Chowdhuri,subsect. nov.

Caules herbacei,elati,ramosi.Folia ovato-lanceolata, acuminata,superne gradatim reducta.Calyx tubuloso-campanulatus haud inflatus.Petala bipartita,ligulata;lobis plerumque emarginatis; ungues glabri.Capsula ovoidea haud trisulca.

Type species : S.Olgae Rohrb.

S.Olgae Rohrb. S.phinicodonta Franch.

S.pachyrrhiza Franch. S.lankongensis Franch.

S.viscidula Franch. S.yannanensis Franch.

Dist. Siberia & China.

Subsection ~~Ted.~~ Brachycarpae Chowdhuri,subsect. nov.

Caules caespitosi,pumili vel elati,erecti vel arcuato-erecti.Folia lineari-lanceolata.Flores dioici.Ungues petalorum glabri.Calyx haud inflatus.Capsula ovoideo-conica,trisulca

Type species : S.brachycarpa Boiss. & Bal.

S.brachycarpa Boiss. & Bal.

S.cappadocica Boiss. & Heldr.

Dist. Orient.

Section ~~13.~~ Ampullatae Boiss.,Fl.Or.,i, 571 (1867).

Perennial herb,pubescent or hirsute,often glandular above.

Root with a multicipital crown.Caudex slender,branched,ascending. Stem erect or arcuately erect,sparingly branched above.Caudical leaves linear;cauline ones linear-lanceolate;leaves of the sucker linear,usually fasciculate.Inflorescence a panicle;cymules alternate, more or less short,erect,3-flowered.Flowers dioecious,subsessile, crowded at the apices of the cymule.Calyx ovate-campanulate or oblong at anthesis,becoming ovate or subglobose and much inflated in fruit;apex contracted.Petals white,bipartite;ligules small;claw minutely auriculate,smooth or ciliate.Filaments smooth.Fruit small 1-2-seeded,indehiscent,stipitate,included.Seed with concave back and flat or convex face. Type species: S.ampullata Boiss.

~~S.ampullata Boiss.~~
Distr. Turkey

Section ~~1~~ Caespitosae Chowdhuri, sect. nov.

Herbae perennes, caespitosi,pumili ,pubescentes interdum superne glabrescentes.Radix lignosa,multiceps.Caudex brevis,tenuis,lignosus,foliosus,ramosus.Caules tenues,erecti, simplices vel in regione inflorescentiae paullum ramosi.Folia caudicalia et caulina inferiora rosulata,conspicua,petiolata, linearia vel lineari-lanceolata;folia caulina altera similia, sessilia,gradatim reducta,vel parva,remota,bracteiformia. Inflorescentia racemiformes vel paniculato-racemiformes,racemi ramis brevibus,oppositis,1-3-floris.Flores hermaphroditi, pedicellati rare subsessiles.Calyx tubuloso-clavatus vel ovato-campanulatus.Petala alba vel rosea,bipartita,ligulata;ungues ciliatuli raro glabri.Filamenta glabra.Capsula oblonga rarius ovoidea,calyce inclusa.Semina dorso canaliculata,faciebus plana.

Type species : S.tenella C.A.Mey

Subsection ~~I~~a. Dianthioideae Chowdhuri, subsect. nov.

Folia caudicalia et caulina inferiora numerosa, rosulata; folia caulina altera parva, remota, bracteiformia. Rami inflorescentiae I-3-flori. Calyx ovato-campanulatus, in fructu turbinatus. Petala eligulata. Capsula obovata vel oblongo-obovata.

Type species : S.dianthioides Pers.

S.dianthioides Pers.

S.Marcowiczii Schischkin

Distr. Turkey & Caucasus.

Subsection ~~I~~b. Stenophyllae (Boiss.) Chowdhuri, comb. et stat. nov.

Syn. Sect. Stenophyllae Boiss., Fl. Or., i, 576 (1867).

Caudical and lower cauline leaves rosulate; other cauline leaves gradually reduced upwards. Branches of the inflorescence opposite, usually I-flowered. Flowers rather large, pedicellate, erect or subnodding. Calyx tubular-clavate becoming clavate in fruit. Petals ligulate. Capsule oblong or ovoid

Type species : S.lineata Boiss. & Buhse (Lectotype S.tenella C.A.Mey)

S.lineata Boiss. & Buhse — S.caespitosa Stev.

S.tenella C.A.Mey — S.longidens Schischkin

S.linifolia Sibth.& Sm. — S.pharnaceifolia Fenzl

Distr. Greece, Turkey & Caucasus.

Section ~~I~~5. Suffruticosae (Rohrb.) Chowdhuri, comb. et stat. nov.

Syn. Sect. Botryosilene series Suffruticosae Rohrb., Monogr. Sil., 74 (1868).

Perennial herbs, pubescent, glandular-puberulent or hirsute, rarely scabrous or glabrous, sometimes viscid above. Root with a simple or multicipital crown. Caudex slender, becoming branched &

suffruticose.Stem erect,ascending or arcuately-erect,leafy,branched especially above.Caudical and lower cauline leaves usually rather small,rosulate,petiolate,persistent or disappearing in old plants; other cauline leaves gradually increasing upwards and reaching maximum size in the middle portion,upper ones gradually reduced, rarely cauline leaves are more or less reduced,linear-lanceolate, lanceolate or ovate-lanceolate,1- or 3-5-nerved at base.Inflorescence a panicle,sometimes passing into a dichasium;cymules usually alternate 1-3- or 5-flowered.Flowers usually large,hermaphrodite,pedicellate. Calyx tubular-clavate or clavate,in fruit becoming clavate with a constriction below the capsule;nerves pinkish rarely greenish, more or less prominent.Petals white,sometimes pink,bipartite,ligulate; claw usually auriculate and smooth.Filaments smooth.Capsule ovoid or oblong,stipitate,included.Seed with flat face and grooved back.

Lectotype ~~Type species~~ :S.suffrutescens M.B.

subsect.

Subsection ~~15a.~~ Supinae ~~(Schischkin)~~ Chowdhuri, ~~comb.et stat.~~nov.

Syn. Sect.Spergulifoliae subsect.Supinae Schischkin in Komarov,Fl. U. R. S. S.,vi, 655 (1936). - descr. russ.

Folia caulina linearia vel lineari-lanceolata vel linearispathulata.Flores erecti.Calyx tubulosus vel anguste tubulosoclavatus,in fructu clavatus haud inflatus;nervis plerumque non prominentibus.Ungues petalorum exauriculati.

Type species :S.supina M.B.

S.cretacea Fisch.

S.supina M.B.

S.brahuica Boiss.

Distr. S.E. Europe, Orient.

subsect. nov.

Subsection ~~15b.~~ Aucherianae ~~(Schischkin)~~ Chowdhuri, ~~comb.et stat.~~

Syn. Sect.Auriculatae subsect.Aucherianae Schischkin in Komarov,Fl. U. R. S. S.,vi, 657 (I936).– descr. russ.

Folia lanceolata vel oblong-lanceolata,I- or 3-5-nervia. Flores erecti. Calyx tubuloso-clavatus vel clavatus;in fructu clavatus,interdum plus minus inflatus;nervis prominentibus.Ungues petalorum auriculati.

Type species : S.Montbretiana Boiss.

S.Montbretiana Boiss.	S.persica Boiss.
S.Bornmuelleri Freyn	S.suffrutescens M.B.
S.eriocalycina Boiss.	S.arguta Fenzl
S.nurensis Boiss.& Hausskn.	S.incurvifolia Kar. & Kir.
	S.oreophila Boiss.

Subsection ~~15c.~~ Tomentellae Schischkin ex Chowdhuri.

Syn.Sect.Suffruticosae subsect.Tomentellae Schischkin in Komarov,Fl.U.R. S. S.,vi, 648 (I936).– descr. russ.

Folia lineari-lanceolata,uninervia,inferiora plus minus conferta.Flores subnutantes.Calyx tubuloso-clavatus haud inflatus. Ungues petalorum et filamenta ciliatuli.

Type species :S.tomentella Schischkin

S.tomentella Schischkin

S.Semenovii Regel & Herd.

Section ~~16.~~ Odontopetalae Schischkin ex Chowdhuri.

Syn. Sect.Odontopetalae Schischkin in Komarov,Fl.U. R. S. S.,vi, 602 (I936).– descr. russ.

Herbae perennes,suffrutescentes,pluricaules,pubescentes, glanduloso- vel hirtello-pubescentes,rare glabrescentes.Radix lignosa multiceps.Caudex lignosus,erectus,ramosus,superne foliatus.

Caules pumili,erecti vel ascendenti-erecti,simplices vel paullum ramosi,foliosi.Folia caudicalia numerosa,plus minus magna,rosulata, petiolata,lineari-lanceolata,lanceolata vel ovato-lanceolata vel oblongo-lanceolata;folia caulina sessilia, lanceolata vel ovato-lanceolata vel lineari-lanceolata,superne gradatim reducta.Flores solitarii vel in dichasia 2-20-flora dispositi,pedicellati,erecti vel subnutantes.Calyx membranaceus,inflatus,campanulatus vel ovato-campanulatus vel tubuloso-campanulatus,puberulus vel glanduloso- vel papilloso- vel hirtello- puberulus,10-nervius.Petala bipartita, ligulata;ungues auriculati,glabri vel ciliatuli.Capsula ovoidea vel ovoideo-globosa,stipitata,calyce inclusa.Semina faciebus plana.

Type species :S.odontopetala Fenzl

Subsection ~~16a.~~ Dentatae Chowdhuri,subsect. nov.

Caules erecti,plus minus crassiusculi.Flores erecti. Calyx campanulatus vel ovato-campanulatus,dentibus acutis vel acuminatis.Lamina bipartita e basi dentata;ungues glabri.Capsula ovoidea vel ovoideo-globosa anthophoro 1-3plo longior.

Type species :S.odontopetala Fenzl

S.odontopetala Fenzl
S.candicans Celak.
S.oreina Schischkin
S.araxina Trautv.
S.turcomina Schischkin
S.oblanceolata W.W.Sm.
S.Delavayi Franch.
S.Zawadskii Herbich.
S.samarkandensis Preobr.
S.conformifolia Preobr.
S.Michelsoni Preobr.
S.adenopetala H.Raik.
S.Raddeana Trautv.
S.auriculata Sibth.& Sm.
S.Requienii DC.
S.Elizabethae Jan.

Distr. S. Europe through Orient to China.

subsect. nov.

Subsection ~~16b.~~ Lychnideae (~~Schischkin ex~~) Chowdhuri, ~~comb. et stat. nov.~~

Syn. Sect. Auriculatae subsect. Lychnideae Schischkin in Komarov, Fl.U. R. S. S.,vi, 662(1936). - Reser. russ.

Caules tenues,ascendentes.Flores subnutantes.Calyx tubuloso-campanulatus rare clavatus;dentibus obtusis.Dentes ad basin laminae deficiunt;ungues ciliatuli.Capsula ovoidea,anthophoro I -I½-plo longior

Type species :S.lychnidea C.A.Mey

S.lychnidea C.A.Mey

S.kubanensis Som.& Lev.

S.petraea Adams

Distr. Siberia, China & Tibet.

Section ~~17.~~ Cordifoliae Chowdhuri, sect. nov.

Herbae perennes,caespitosi ,pluricaules,glanduloso- vel hirtello-pubescentes vel pubescentes.Caudex erectus,lignosus, brevis,simplex vel furcatus,superne foliatus.Caules erecti,foliosi, superne sparse ramosi.Folia caudicalia numerosa,petiolata, spathulata vel ovato-lanceolata,acuminata;folia caulina plerumque numerosa,conspicua,superne gradatim reducta,cordato-ovata rarius ovato-lanceolata,acuminata.Flores pauci in dichasia dispositi,erecti pedicellati.Calyx clavatus,inflatus,glanduloso-pubescens,rarius hirsutus;dentibus acuminatis.Petala emarginata vel bipartita vel quadripartita,ligulata;ungues glabri,exauriculati (exc.S.melandrioi -des Lange).Capsula oblonga,stipitata,calyce inclusa.Semina forma variantia.

Type species :S.cordifolia All.

S.cordifolia All.

S.foetida Link.

S.melandrioides Lange

S.acutifolia Link.

S.lazica Boiss.

Distr. S. Europe, Turkey & Caucasus,

Section ~~18.~~ Fimbriatae Boiss.,Fl.Or.,i,574 (1867).

Tall perennial herbs,pubescent,glandular-puberulent, sometimes hirsute.Stem leafy,branched in the region of inflorescence. Leaves large,ovate often with cordate base,3-5-nerved,acute or acuminate.Flowers many,in a dichasial cyme,pedicellate,hermaphrodite. Calyx greenish,membraneous,campanulate or ovate-campanulate,10-20-nerved;nerves reticulately anastomosed.Lamina laciniate,ligulate or eligulate.Capsule ovoid,subsessile or stipitate,included.Seed various.

~~Type species~~ Lectotype : S.multifida (Adams)Rohrb.

S.physalodes Boiss. S.lacera Stev.

S.schizopetala Bornm. S.campanula Wats.

S.multifida (Adams)Rohrb.

Distr. Orient & Caucasus

Section ~~19.~~ Inflatae Boiss.,Fl.Or.,i, 573 (1867).

Perennial herbs,glabrous,glaucous,very rarely puberulent. Root woody,slender or stout,rarely fusiform,with a multicipital crown. Caudex slender,woody,branched,ascending.Stem erect or ascending, leafy,branched from the middle upwards,rarely throughout.Caudical leaves small,rosulate,often disappearing from the old plant,rarely large and conspicuous;cauline leaves numerous,conspicuous,increasing in size upwards;upper ones gradually reduced,lanceolate,ovate-lanceolate,ovate or obovate.Flowers many,large,in a dichasial cyme; branches of the dichasium equal or unequal,erect;flowers erect or subnodding,hermaphrodite.Calyx membraneous,ovate-campanulate or ovate-cylindrical,inflated or subinflated;nerves 10-20,anastomosed. Petals bipartite,rarely emarginate;claw auriculate;ligules usually small or absent.Capsule ovoid or ovoid-globose,subsessile,usually included.

~~Type species~~ Lectotype : S.Cucubalus Wibel

Subsection ~~19a.~~ Latifoliae Chowdhuri, subsect.nov.

Planta glabra.Caules erecti vel ascendentes,rarius prostrati.Folia caulina magna,lanceolata,ovato-lanceolata vel ovata vel obovata.Calyx ovato-campanulatus vel ovato-cylindricus,glaber. Lamina petalorum bipartita.

Type species :S.Cucubalus Wibel

S.Cucubalus Wibel	S.Fabaria Sibth. & Sm.
S.Czerei Baumg.	S.caesia Sibth.& Sm.
S.uniflora Roth	S.glareosa Jord.
S.Thorei Duf.	S.thebana Orph.
S.rupricola Bor.	S.variegata (Desf.)Boiss. & Heldr.
S.fabarioides Hausskn.	

Distr. Mediterranean.

Subsection ~~19b.~~ Procumbentes ~~(Schischkin ex)~~Chowdhuri, ~~comb. et stat.~~ subsect. nov.

Syn. Sect. Procumbentes Schischkin in Komarov,Fl. U.R. S. S., vi, 601 (1936).

Planta pubescenti-scabrida.Caules procumbentes.Folia anguste lanceolata vel lineari-lanceolata.Calyx campanulatus,hirsutus vel puberulus.Lamina petalorum emarginata.

Type species :S.procumbens Murr.

~~S.procumbens Murr.~~

Distr. Siberia

Section ~~20.~~ Brachypodae Boiss.,Fl.Or.,i,575 (1867).

Perennial herbs,pubescent,sometimes grisea with tomentose hairs,rarely glabrous above.Caudex stout,woody,more or less short,

sparingly branched,in plants more than I-year old covered with leaf scars and bases of old petioles,leafy at the crown.Stem erect or arcuately erect,simple or branched above.Caudical leaves large, rosulate,petiolate,lanceolate-spathulate;cauline leaves gradually reduced upwards,sessile,lanceolate or linear-lanceolate.Flowers usually many in a dichasial cyme,often congested,sometimes crowded at the apices of the branches;rarely reduced to I,erect at anthesis, sometimes nodding after anthesis.Calyx clavate or oblong-clavate, becoming oblong or oblong-clavate in fruit with base more or less constricted below the capsule.Petals greenish,bipartite;ligules usually present.Capsule oblong or ovoid-oblong,stipitate,included or semiexserted.Seed with flat face and grooved back.

Type species (lectotype) :S.grisea Boiss.

Distr. Orient & Greece.

Subsection ~~20a.~~ Nutantes Chowdhuri,subsect. nov.

Flores breviter pedicellati;pedicelli floriferi erecti fructiferi nutantes.

Type species : S.grisea Boiss.

S.grisea Boiss. S.monerantha Williams

S.oreosinaica Chowdhuri S.cephalenia Heldr.

Subsection ~~20b.~~ Erectae Chowdhuri,subsect. nov.

Flores longe pedicellati,solitarii vel pauci;pedicelli floriferi et fructiferi erecti.

Type species : S.flavescens Waldst. & Kit.

S.flavescens Waldst. & Kit. S.congesta Sibth.& Sm.

S.leptoclada Boiss. S.flammulifolia Steud.

S.thessalonica Boiss.& Heldr.

Section ~~21.~~ Pinifoliae Chowdhuri,sect. nov.

Herbae perennes,suffrutescentes,pubescentes vel

glanduloso-pubescentes.Radix lignosa,elongata,plerumque multiceps. Caudex lignosus,ramosus,foliosus.Caules elati vel pumili,caespitosi, simplices vel sparse ramosi.Folia caudicalia lineari-subulata, triquetra,plerumque aceroso-pungentia,erecta vel patenti-recurva, interdum falcata vel subfalcata;folia caulina plerumque pauca, reducta,bracteiformia,rarius similia gradatim reducta.Flores hermaphroditi,pedicellati,solitarii vel in dichasia 2-7[flora dispositi.Calyx tubuloso-clavatus rare subinflato-oblongus.Petala alba vel purpurea,bipartita,ligulata;ungues glabri,auriculati. Capsula ovoideo-oblonga vel oblonga,stipitata,calyce inclusa rarius tota calyce exserta.Semina dorso canaliculata,faciebus plana.

Type species : S.echinus Boiss. & Heldr.

Subsection ~~2Ia.~~ Fruticosae~~(Schischkin)~~Chowdhuri,~~comb. et stat.~~ subsect. nov.

Syn. Sect. Suffruticosae subsect.Fruticosae Schischkin in Komarov,Fl. U. R. S. S.,vi,646 (1936).

Caudex lignosus,crassiusculus,brevis,rectus,simplex vel furcatus,foliosus.Caules superne sparse ramosi.Folia monomorphica. Flores in dichasia 2-7[flora dispositi rare solitarii.Calyx haud inflatus

Type species : S.goniocaula Boiss.

S.goniocaula Boiss. S.tragacantha Fenzl

S.nodulosa Boiss. S.Alexandrae Keller

S.altaica Pers.

Subsection 2Ib. Masmenae Chowdhuri,subsect. nov.

Caudex lignosus,elongatus,tenuis,valde ramosus,foliosus. Caules scapiformes.Folia caulina reducta,remota,bracteiformia. Flores solitarii.Calyx tubuloso-clavatus,haud inflatus.

Type species: S.masmenaea Boiss.

S.masmenaea Boiss. S.subulata Boiss.

S.echinus Boiss. & Heldr. S.Caryophylloides(Poir)Otth

S.falcata Sibth. & Sm.

Subsection ~~21c.~~ Pungentes Chowdhuri, subsect. nov.

Caudex lignosus,elongatus,tenuis,valde ramosus,foliosus. Folia caulina caudicalibus similia,gradatim reducta.Flores solitarii vel bini.Calyx subampliato-oblongus.

Type species : S.pungens Boiss.

~~S.pungens Boiss.~~

Dish. Turkey.

Section ~~28.~~ Auriculatae Boiss.,Fl.Or.,i,572 (1867).

Perennial herbs,dwarf,caespitose,pubescent,glandular- or scabrous-puberulent or hirsute,often viscid.Caudex slender, woody,long,ascending or erect,sometimes prostrate,in plants more than one-year old covered with leaf scars and bases of old petioles, 1-several-stemmed.Stem simple,erect or ascending.Caudical leaves rosulate,large,petiolate,lanceolate or oblong-lanceolate,rarely ovate;cauline leaves usually similar to caudical ones,gradually reduced above,sometimes much reduced and bract-like.Flowers usually large,solitary,hermaphrodite,pedicellate.Calyx tubular-clavate or clavate ,sometimes more or less inflated in fruit.Petals white or pink,bipartite,ligulate;claw usually auriculate,smooth. Capsule ovoid or oblong-ovoid with long anthophore,included.Seed with flat face and grooved back.

Lectotype

Type species : S.Boryi Boiss.

Subsection ~~22a.~~ Scapiformes Chowdhuri,subsect. nov.

Caules scapiformes.Folia caudicalia numerosa,rosulata,

linearia vel lineari-lanceolata rare lanceolata;folia caulina pauca, reducta,remota,bracteiformia,3-nervia.Flores solitarii vel in dichasia 2-3 (5)-flora dispositi

Type species : S.rhynchocarpa Boiss.

S.rhynchocarpa Boiss.

S.argaea Fisch. & Mey.

S.lucida Chowdhuri

Distr. Orient.

Subsection ~~28.~~ Brevicaulae Chowdhuri,subsect. nov.

Caules foliosi.Folia caulina caudicalibus similia,sessilia gradatim reducta.Flores solitarii vel bini.

Type species : S.brevicaulis Boiss.

S.brevicaulis Boiss.

S.Boryi Boiss.

S.Davisii Chowdhuri

S.depressa M.B.

S.pulchella Chowdhuri

S.antitaurica Chowdhuri

S.caucasica Boiss.

S.vallesia Linn.

S.palinotricha Fenzl

S.parvula Coss.

S.microphylla Boiss.

S.minutifolia Chowdhuri

S.papillifolia Williams

S.araratica Schischkin

S.eremicana Stapf

Distr. S.Europe, Orient & N.Africa

Section ~~23.~~ Quadrilobatae Chowdhuri,sect. nov.

Herbae perennes,caespitosi,pubescentes vel glanduloso-pubescentes.Radix lignosa,tenuis,multiceps.Caudex lignosus,brevis, foliosus,ramosus.Caules erecti,ramosi,foliosi.Folia omnia linearilanceolata,lanceolata,oblanceolata,inferiora petiolata.Flores hermaphroditi,pedicellati,erecti,in dichasio simplici vel composito dispositi.Calyx tubuloso-clavatus vel tubuloso-campanulatus,interdum subinflatus,puberulus vel glanduloso-puberulus.Petala ligulata,

bipartita;lobis emarginatis,lateralibus plerumque minoribus; ungues obscure auriculati,ciliatuli.Filamenta glabra.Styli 3-4 (5). Capsula ovoideo-oblonga,stipitata,calyce inclusa.Semina plerumque dorso canaliculata,faciebus plana.

Type species : S.Grayi Wats.

S.Grayi Wats. S.Wrightii Gray

S.Hookeri Nutt. S.Suksdorfii Robinson

S.Sargentii Wats.

Disk. N. America.

Section ~~24.~~ Macranthae (Rohrb.) Chowdhuri, ~~comb. et~~ stat.nov.

Syn.Sect.Dichasiosilene series Macranthae Rohrb.,Monogr. Sil.,70 (1868);

Sect.Auriculatae subsect. Macranthae (Rohrb.)Schischkin in Komarov,Fl. U. R. S. S.,vi,664 (1936). - descr. russ.

Perennial herbs,caespitose,pubescent,puberulent or scabrous,sometimes glandular-puberulent.Caudex slender,long,branched, often compact,leafy.Stem leafy or scapiform,simple.Caudical leaves rosulate,linear or linear-lanceolate;cauline ones similar,gradually reduced above or much reduced,remote and bract-like.Flowers solitary or 2-3 in a dichasium,rather small,hermaphrodite,pedicellate.Calyx clavate or clavate-campanulate sometimes obconical-cylindrical. Petals bipartite,ligulate;claw usually exauriculate.Capsule ovoid-oblong,stipitate,included or exserted.Seed with flat face and grooved back.

Type ~~species~~ Lectotype : S.Saxifraga Linn.

Subsection ~~24a.~~ Dianthifoliae Chowdhuri,subsect. nov.

Caudex tenuis,lignosus,brevis,ramosus,foliosus.Folia caudicalia numerosa,rosulata;folia caulina reducta,remota,plerumque bracteiformia.Flores solitarii vel bini.Calyx obconico-cylindricus. Ungues petalorum glabri interdum auriculati.Planta glabra.

Type species : S.dianthifolia J.Gay

S.dianthifolia J.Gay

S.Schlumbergeri Boiss.

S.Porteri Post

S.infidelium Post

Distr. Orient

Subsection ~~2nd.~~ Saxifragae Chowdhuri ,subsect. nov.

Caudex lignosus,tenuis,elongatus,ramosus,foliatus.Folia caudicalia rosulata,linearia vel lineari-lanceolata;folia caulina caudicalibus similia,superne gradatim reducta.Calyx clavatus rarius clavato-campanulatus.Ungues petalorum interdum ciliatuli.Planta puberulo-scabridula.

Type species : S.Saxifraga Linn.

S.Saxifraga Linn.

S.pindicula Hausskn.

S.Orphanidis Boiss

S.gracillima Rohrb.

S.Schmuckeri Wettst.

S.multicaulis Guss.

S.fruticulosa Sieb.

S.clavata(Hampe)Rohrb.

S.macropoda Velen.

S.Urvillei Schott

S.capillipes Boiss.& Heldr.

S.campanula Pers.

Distr. S.E. Europe & Turkey.

Subsection ~~2nd.~~ Pulvinatae Chowdhuri ,subsect. nov.

Caudex lignosus,tenuis,ramosus valde compactus,foliosus. Caules scapiformes.Folia caudicalia numerosa,rosulata,linearia vel lanceolata;folia caulina reducta,remota,bracteiformia.Calyx clavatus. Ungues petalorum glabri,exauriculati.Planta glanduloso-puberula.

Type species : S.oreades Boiss. & Heldr.

S.oreades Boiss. & Heldr.

S.Barbeyana Heldr.

S.heterodonta Williams

S.xylobasis Freyn

Distr. Greece & Turkey.

Section 25. Nanosilene Otth in DC.,Prodr.,i,367 (I824).

Syn. Sect. Pumilio Reichb.,Fl.Germ. Excurs.,822 (I832).

Gen. Xamilenis Raf.,Aut. Bot.,24 (I840).

Perennial herb,caespitose,glabrescent.Caudex woody, slender,branched,leafy,more or less prostrate.Stem short,scapiform. Caudical leaves rosulate,linear;cauline leaves similar to caudical ones,few,gradually reduced above.Flowers solitary,or 2-3 in a dichasial cyme,unisexual by abortion ,pedicellate.Calyx campanulate. Petals ligulate,emarginate;claw exauriculate.Capsule ovoid-oblong, subsessile,included,or somewhat exserted.Seed with grooved back.

Type species : S.acaulis Linn.

~~S.acaulis Linn.~~

Distr. Circumboreal.

Section 26. Cucubaloideae Edgew. & Hook. in Hook.,Fl. Br. India,i, 221 (I875).

Perennial herbs,pubescent,glandular- or hirsute-puberulent,rarely glabrescent.Caudex slender or stout,erect or ascending,sometimes more or less prostrate,branched,leafy or naked.Stem erect or ascending,simple or branched,leafy.Caudical & lower cauline leaves usually large and conspicuous,sometimes small; other cauline leaves generally reduced upwards,sometimes conspicuous and more or less fasciculate;all leaves ovate,ovate-lanceolate or lanceolate with rounded base,I-3 (5)-nerved.Inflorescence a simple or compound dichasial cyme.Flowers hermaphrodite,erect.Calyx cylindrical-clavate,in fruit clavate with base usually more or less constricted below the capsule.Petals bipartite,ligulate;claw and filament smooth.Capsule ovoid or oblong-ovoid,stipitate,included. Seed with flat face and grooved back.

Lectotype

Type species : S.khasiana Rohrb.

Subsection ~~26a.~~ Schaftae (Boiss.)Chowdhuri, comb.et stat. nov.

Syn. Sect. Schaftae Boiss.,Fl.Or.,i,577(1867).

Caudex slender, more or less prostrate,branched.Stem dwarf,erect or ascending,leafy,sparingly branched.Caudical leaves usually small,rosulate;cauline leaves conspicuous,often fasciculate, 1-nerved.Inflorescence a few-flowered cyme.Calyx narrow,tubular-clavate. Petals bipartite,ligulate;lobes entire

Type species ~~:~~ Lectotype : S.Schafta Gmel.

S.Schafta Gmel.

S.humilis C.A.Mey

S.macronychia Boiss.

Distr. Orient & Caucasus

Subsection ~~26b.~~ Sinenses Chowdhuri, subsect. nov.

Caudex lignosus,erectus,foliosus.Caules elati,ramosi, foliosi.Folia caudicalia numerosa,magna,rosulata;folia caulina superne gradatim reducta;omnia ovata vel ovato-lanceolata saepe lineari-lanceolata vel lanceolata,acuminata,plerumque 3-5-nervia. Flores plures,in dichasio-compositio dispositi.Calyx tubuloso-clavatus.Petala bipartita,ligulata;lobes plerumque emarginatis.

Type species : ~~S.khasiana~~ Rohrb. S. grandiflora Franch.

S.khasiana Rohrb.

S.vagans C.B.Clarke

S.burmanica Coll. & Hemsl.

S.Tatarinowii Regel

S.asclepiadea Franch.

S.grandiflora Franch.

S.cardiopetala Franch.

S.salweenensis W.W.Sm.

S.adenantha Franch.

S.rubicunda Franch.

S.rosiflora K.Ward

S.bilingua W.W.Sm.

S.Monbeigi W.W.Sm.

S.esquamata W.W.Sm.

S.Maximowicziana Rohrb.

Distr. China & India

Rupifraga Otth. in DC., Prodr. i, - - -

Section 27. Brachyanthae (Rohrb.) Chowdhuri, comb. et stat. nov.

Syn. Sect. Dichasiosilene series Brachyanthae Rohrb., Monogr. Sil., 7I (1868).

Gen. Anotites Greene, Leaflets Bot. Obs., i, 97 (1905).

Perennial herbs, dwarf, glabrescent or puberulent. Caudex short, slender, branched, leafy, many-stemmed. Stem ascending or erect, rarely prostrate, branched, leafy. Caudical leaves rosulate, lanceolate, ovate-lanceolate or ovate; cauline leaves many, similar to caudical ones, gradually reduced above. Inflorescence a dichasial cyme, many flowered. Flowers small, hermaphrodite, erect, pedicellate. Calyx obconical or shortly clavate. Petals emarginate or bifid; ligules small or absent; claw and filament smooth. Capsule ovoid or ovoid-globose rarely oblong, stipitate, included. Seed with flat face.

Lectotype ; ~~Type species~~ ; S. rupestris Linn.

S. rupestris Linn.	S. cryptopetala Hilleb.
S. macedonica Formanek	S. Menziesii Hook.
S. Lerchenfeldiana Baumg.	S. Seeleyi Mort. & Thomps.
S. Williamsii Britt.	S. Dorrii Kell.

Subsect. Heliosperma.

Section 28. Compactae Boiss., Fl. Or., i, 569 (1867).

Annual, biennial or short lived perennial herbs, glabrous, often glaucous. Caudex short, stout, more or less woody, simple or forked, leafy. Stem simple or branched, erect, leafy. Caudical leaves rosulate, spathulate or lanceolate-spathulate; cauline leaves numerous, ovate, ovate-lanceolate or linear-lanceolate, gradually reduced upwards. Inflorescence a many-flowered dichasium, usually condensed into a capitate or corymbose cyme. Flowers hermaphrodite, erect, shortly pedicellate. Calyx cylindrical-clavate, membraneous. Petals entire or

emarginate;ligules long and prominent;claw and filament smooth. Capsule oblong,stipitate,included.Seed with flat face and usually grooved back. Lectotype : Type species : S.compacta Fisch.

S.Armeria Linn. S.Asterias Griseb.

S.compacta Fisch. S.Vandasii Nabelek

S.Reuteriana Boiss. & Bl.

Distr. N. & E. Mediterranean, Orient & Russia.

Section 29. Succulentae Boiss.,Fl.Or.,i,576 (1867).

Perennial or annual herbs,pubescent,glandular-puberulent, sometimes tomentose,usually viscid.Caudex in perennial species long, slender,woody,leafy,branched,ascending or prostrate.Stem branched, leafy,often diffuse.Leaves monomorphic,ovate-lanceolate,oblong-lanceolate or ovate sometimes obovate,more or less fleshy,often succulent;lower leaves usually small;upper ones numerous,conspicuous, gradually reduced above.Inflorescence a raceme-like or monochasial cyme.Pedicels of the lower flowers usually long,sometimes deflexed in fruit.Flowers hermaphrodite,erect.Calyx clavate or oblong-clavate.Petals ligulate,bipartite;claw exauriculate,smooth, conspicuously exserted.Capsule oblong,stipitate,included.Seed with grooved back. Lectotype Type species : S.succulenta Forsk.

S.succulenta Forsk. S.villosa Forsk.

S.thymifolia Sibth.& Sm. S.littorea Brot.

S.Pontica Brandz.

Distr. Mediterranean

Section 30. Melandriformes Boiss.,Fl.Or.,i,568 (1867).

Annual,biennial or short-lived perennial herbs,hirsute, glandular-puberulent and viscid above.Stem tall,leafy,branched. Caudical leaves rosulate,oblanceolate or lanceolate;cauline leaves

many,conspicuous,ovate- or elliptical-lanceolate,3-5-nerved. Inflorescence a compound dichasial cyme.Flowers hermaphrodite or unisexual,pedicellate,erect.Calyx cylindrical or cylindrical-clavate, sometimes somewhat inflated.Petals bipartite,ligulate.Filaments smooth.Styles 3-5.Capsule oblong-ovoid,subsessile,included.Seed with flat face and grooved back.

Type species :S.noctiflora Linn.

S.noctiflora Linn

S.alba (Mill.)Krause S.diurna Godr.

Dist. Europe & Orient.

Section 31. Saponarioideae Boiss.,Fl.Or.,i,568 (1867).

Annual herb, dwarf, puberulent.Caudex short,leafy.Stem erect,branched,leafy.Caudical leaves rosulate, more or less small, lanceolate or linear-lanceolate;cauline leaves conspicuous and large,like the caudical ones.Flowers in a dichasial cyme,erect, hermaphrodite,pedicellate.Calyx cylindrical,in fruit clavate and somewhat inflated.Petals entire or tridentate,ligulate;claw smooth, auriculate.Filaments smooth.Capsule ovoid-oblong,stipitate,included. Seed compressed,with flat face and deeply & acutely grooved back with two wavy wings. Type species :S.nana Kar. & Kir.

S.nana Kar. & Kir.

Dist. Orient & Russia.

Section 32. Rigidulae Boiss.,Fl.Or.,i, 571 (1867).

Annual,biennial,sometimes perennial herbs,rigid,puberulent. Caudex short,often woody,branched,leafy.Stem erect,leafy,branched; branches rigid and filiform.Caudical leaves rosulate,large,linear, linear- or oblong-lanceolate;cauline leaves similar to caudical ones, gradually reduced above,sometimes fasciculate.Flowers in a compound

dichasial cyme;branches of the dichasium equal or nearly so;flowers hermaphrodite,pedicellate,erect.Calyx cylindrical or cylindrical-clavate,in fruit clavate with base more or less narrowed below the capsule;apex not contracted.Petals bipartite,ligulate;claw smooth or ciliate,exauriculate.Filaments smooth or pilose.Capsule ovoid or ovoid-oblong,stipitate,included.Seed with flat face.

Lectotype
Type species : S.picta Pers.

S.portensis Linn.	S.arenosa C.Koch
S.mentagensis Coss.	S.Kotschyi Boiss.
S.Hussoni Boiss.	S.intricata Post
S.echinosperma Boiss.	S.striata(Ehrbg.)Rohrb.
S.picta Pers.	S.inaperta Linn.
S.linearis Decaisne	S.chaetodonta Boiss.
S.reticulata Desf.	S.pinetorum Boiss. & Heldr.

Distr. Mediterranean & Orient, ex [illegible] & Russia & Ind.

Section 38. Atocion Griseb.,Spicil. Fl. Rum.Bith.,i,168 (1843).

Syn. Sect.Atocieae Boiss.,Fl.Or.,i,570 (1867).

Sect.Dichasiosilene series Atocia Rohrb.,Monogr.Sil., 71 (1868).

Annual tender herbs,pubescent,glandular-puberulent, sometimes hispid,usually viscid above.Stem leafy, generally branched, erect or ascending;branches ascending or divaricate.Caudical leaves rosulate,rather small, ovate or ovate-lanceolate or lanceolate; cauline leaves conspicuous,large,gradually reduced upwards,usually similar to the caudical leaves.Inflorescence a dichasial cyme; branches of the dichasium equal or unequal;sometimes the dichasium passes into a monochasium above.Flowers hermaphrodite,pedicellate, erect.Calyx tubular or tubular-clavate,sometimes oblong,in fruit clavate with constricted base;apex wide open.Petals entire or

emarginate rarely bifid,ligulate.Capsule ovoid or ovoid-oblong or oblong,stipitate,included.Seed various.

Lectotype
~~Type species~~ : S.aegyptiaca (L.) Linn. fil.

Subsection 33a. Rubellae (Battand.)Chowdhuri,comb.nov.

Syn. Siphonomorpha subsect.Rubellae Battand. in Battand. & Trabut.,Fl.de l'Alg.,i, I37 (I888).

Caules superne ramosi;ramis brevibus,strictis. Inflorescentia corymbiformis.Flores calyce brevius pedicellati. Petala integra.Capsula ovoidea vel oblongo-ovoidea.Semina dorso canaliculata,faciebus curvato-excavata

Lectotype
~~Type species~~ ;S.rubella Linn.

S.rubella Linn.
S.fuscata Link.
S.pseudo-Atocion Desf.
S.Bergiana Lindm.
S.argillosa Munby
S.segetalis Duf.
S.turbinata Guss.
S.volubilitana Br.-Bl.& Maire

Distr. Mediterranean.

Subsection 33b. Delicatulae Chowdhuri,subsect. nov.

Caules superne ramosi vel e basi ramosi;ramis strictis. Inflorescentia corymbiformis.Flores calyce brevius pedicellati. Petala integra vel bipartita.Capsula ovoidea,stipitata.Semina subglobosa,profunde umbilicata

Type species : S.aegyptiaca (L.)Linn.fil.

S.aegyptiaca (L.)Linn.fil
S.delicatula Boiss.
S.insularis Barbey

Distr. Mediterranean & Orient

Subsection 33c. Divaricatae (Battand.)Chowdhuri,comb. nov.

Syn.Siphonomorpha subsect. Divaricatae Battand. in Battand. & Trabut.,Fl. de l'Alg.,i, I38 (I888).

Caules tenui,ramosi;ramis divaricatis.Inflorescentia diffusa rare ~~inflorescentia~~ superne scorpioidea.Flores longe pedicellati.Calyx oblongus,in fructu clavatus.Petala integra vel emarginata.Capsula oblonga,stipitata.Semina dorso canaliculata, faciebus plana. Lectotype Type species : S.divaricata Clem.

S.divaricata Clem.	S.laconia Boiss.& Orph.
S.integripetala Bory & Chaub.	S.pentelica Boiss.
S.virescens Coss.	S.Haussknechtii Heldr.
S.mekinensis Coss.	S. sedoides Poir.

Distr. Mediterranean

Section 34. Leiocalycinae Boiss.,Fl.Or.,i, 569 (I867).

Annual herbs,glabrous,sometimes puberulent below,becoming glabrous and viscid above.Stem erect, usually branched above,sometimes branched from the base upwards, rarely simple.Caudical leaves rosulate,usually small ovate,obovate- or lanceolate-spathulate; cauline leaves conspicuous and large,oblong- or linear-lanceolate, sometimes reduced,remote and bract-like .Inflorescence a dichasial cyme;branches of the dichasium equal or unequal, rarely passes into a scorpioid cyme .Flowers hermaphrodite,erect.Calyx ovate-campanulate ovate,sometimes cylindrical-clavate,in fruit clavate with contracted apex.Petals bipartite or emarginately bifid,ligulate.Capsule ovoid or ovoid-oblong,stipitate,included.Seed with flat face.

Lectotype Type species : S.Behen Linn.

Subsection 34a. Creticae Chowdhuri, subsect. nov.

Caules tenui,e basi ramosi,rarius simplices .Folia

caudicalia numerosa,rosulata;folia caulina reducta,pauca, remota. Flores longe pedicellati,in dichasia dispositi.Calyx tubuloso-clavatus rare tubuloso-campanulatus;nervis I0,plus minus crassis, prominentibus.Lamina petalorum ampla,integra vel emarginato-biloba. Capsula ovoideo-oblonga.Planta inferne puberula superne glabra.

Type species : S.cretica Linn.

S.cretica Linn. S.Ungeri Fenzl

S.tenuiflora Guss. S.cariensis Boiss.

Distr. N.E. Mediterranean.

Subsection 34b. Muscipulae Chowdhuri,subsect. nov.

Caules superne ramosi,foliosi.Folia caudicalia rosulata, plus minus parva;folia caulina plerumque conspicua,numerosa,superne gradatim reducta.Flores calyce brevius pedicellati, in dichasia dispositi;ramis aequalibus vel inaequalibus, rarius inflorescentia superne scorpioidea.Calyx ovato-campanulatus vel tubuloso-campanulatus vel clavatus.Lamina petalorum plus minus parva, emarginata vel bipartita.Capsula ovoidea.Planta glabra.

Type species : S.muscipula Linn. S. Behen Linn.

S.muscipula Linn. S.Behen Linn.

S.Reinholdii Heldr. S.laevigata Sibth. & Sm.

S.Holzmannii Heldr. S.antirrhina Linn.

S.graeca Boiss. & Sprun.

Distr. Mediterranean.

Section 35. Lasiocalycinae Boiss., Fl.Or.,i, 569 (I867).

Annual herbs,pubescent,hirtellous sometimes scabrous. Stem erect or ascending,leafy,branched from above the middle, rarely branched throughout;branches ascending, sometimes divaricate. Caudical and lower cauline leaves rosulate,rather small;

other cauline leaves conspicuous, large,oblong- or lanceolate-spathulate sometimes lanceolate.Inflorescence a dichasial cyme; branches of the dichasium equal or unequal,often passing into a monochasial cyme;rarely the inflorescence a monochasial cyme. Flowers hermaphrodite,erect,pedicellate.Calyx tubular-clavate,in fruit clavate with contracted apex and constricted base;nerves 10,more or less thick,simple,prominent,papillose,scabrous-bristly or squamate.Petals bipartite,ligulate.Styles 3-5.Capsule ovoid-oblong or ovoid,stipitate.Seed with flat face and grooved back.

Type species (lectotype) : S.squamigera Boiss.

Subsection ~~35a.~~ Papillosae Chowdhuri, subsect. nov.

Flores breviter pedicellati,in dichasia dispositi, dichasii ramis aequalibus.Calyx ad nervos papillosus vel papilloso-scabriusculus;pilis basi non bulboso-incrassatis

Type species : S.papillosa Boiss.

S.papillosa Boiss.

S.crassipes Fenzl

S.linicola Gmel.

Distr. S.E. Europe & Orient.

Subsection ~~35b.~~ Squamatae Chowdhuri,subsect. nov.

Flores in dichasia dispositi;dichasii ramis valde inaequalibus;interdum inflorescentia superne scorpioidea vel flores in cincinnis.Calyx squamatus vel ad nervos pilis basi bulboso-incrassatis. Type species : S.squamigera Boiss.

S.squamigera Boiss.

S.echinata Otth

S.vesiculifera J.Gay

S.trinervia Sebast.& Mauri

S.scabrida Soy-W.& Godr.

S.oropediorum Coss.

Distr. Mediterranean

Subsection ~~35c.~~ Eudianthe (Reichb.) Chowdhuri, comb. nov.

Syn. Eudianthe Reichb.

Flowers in a dichasial cyme. Calyx usually smooth; rugose between the nerves. Styles 5.

Type species : S.coelirosa (Linn.)A.Br.

S.coelirosa (Linn.)A.Br.

S.laeta (Ait.) A.Br.

Distr. W. Mediterranean extending to Greece.

Section ~~36.~~ Fruticulosae (Rohrb.) Chowdhuri, ~~comb. et~~ stat. nov.

Syn. Sect. Cincinnosilene series Fruticulosae Rohrb., Monogr. Sil., 69 (1868).

Perennial herbs, pubescent, glandular-puberulent, hirsute or scabrous-puberulent. Caudex stout or slender, simple or branched, woody, leafy, 1-few-stemmed. Stem erect or ascending, rarely procumbent, simple or branched, leafy. Caudical leaves rosulate, usually conspicuous, sometimes more or less small, lanceolate, linear-lanceolate, obovate or ovate; cauline leaves few, much reduced, or many, conspicuous and gradually reduced above. Inflorescence a monochasial cyme. Flowers large, hermaphrodite, shortly pedicellate. Calyx clavate or tubular-clavate, sometimes slightly inflated, in fruit clavate usually with constricted base. Petals bipartite, ligulate. Capsule usually ovoid-oblong, stipitate. Seed with grooved back.

Lectotype

~~Type species~~ : S.Burchellii Otth

S.Burchellii Otth	S.atlantica Coss.
S.legionensis Lag.	S.Choulettei Coss.
S.Hochstetteri Rohrb.	S.Biafrae Hook.
S.primuliflora Eckl. & Zey.	S.mundiana Eckl.& Zey.
S.intrusa Wight & Arn.	S.elegans Link
S.ciliata Pourr.	S.crassifolia Linn.

Distr. Africa, one species in S. Europe and one in India

Section 37. Erecto-refractae Chowdhuri, sect. nov.

Herbae annuae, pubescentes vel glanduloso-pubescentes. Radix tenuis, elongata. Caudex brevis, simplex vel ramosus, foliosus. Caules erecti vel ascendentes, valde ramosi, rarius simplices, foliosi. Folia inferiora rosulata, ; folia superiora numerosa, lineari- vel ovato-lanceolata vel lanceolata, superne gradatim reducta. Flores in dichasia laxa dispositi vel in cincinnis. Pedicelli plerumque longi, floriferi erecti vel erecto-patuli, fructiferi horizontales, penduli, patulo-refracti vel arcuato-erecti rarius suberecti. Calyx oblongo- vel ovato-clavatus, glanduloso-puberulus, nervis virescentibus prominentibus superne coniunctis, in fructu ovato-ampliatus ad apicem contractus. Petala rosea, bipartita, ligulata. Capsula ovoideo-conica, stipitata. Semina faciebus plana.

Type species : S.Boissieri J.Gay

S.Boissieri J.Gay
S.almolae J.Gay
S.ascendens Lag.
S.psammitis Link
S.pendula Linn.

Section 38. Dichotomae (Rohrb.) Chowdhuri, ~~comb.et~~ stat. nov.

Syn. Sect. Cincinnosilene series Dichotomae Rohrb., Monogr. Sil., 67 (1868).

Annual, biennial, sometimes short lived perennial herbs, puberulent or crisp pubescent. Caudex short, simple or forked, leafy. Stem erect, leafy, branched. Caudical and lower cauline leaves rosulate, lanceolate-spathulate, spathulate or oblong-linear; other cauline leaves gradually reduced above ; leaves often 3-5-nerved. Inflorescence a monochasial cyme; axis simple , or 2-4 times forked with alar flowers. Pedicels short, slender, usually horizontal, in

fruit more or less thick and erect.Flowers hermaphrodite,spreading. Calyx cylindrical-clavate;nerves prominent,greenish,sparingly branched and anastomosed above,usually with crisp or papillose hairs;in fruit ovate-clavate with constricted base and contracted apex.Petals usually white,bipartite;ligules small.Capsule ovoid-conical,shortly stipitate.Seed with flat face.

Lectotype
Type species: S.dichotoma Ehrh.

S.dichotoma Ehrh. S.Heldreichii Boiss.

S.lagenocalyx Fenzl. S.remotiflora Vis.

S.oxyodonta Barbey

Distr. E. Mediterranean & Orient, extending to S. Russia

Section ~~39.~~ Scorpioideae (Rohrb.)Chowdhuri, ~~comb.et~~ stat. nov.

Syn. Sect.Cincinnosilene series Scorpioideae Roheb.,Monogr. Sil., 67 (I868).

Annual,rarely biemmial,or short lived perennial herbs, pubescent,glandular-puberulent,often hirsute.Caudex short,leafy. Stem erect or ascending,branched,sometimes simple,leafy.Caudical leaves rosulate;cauline leaves oblong,lanceolate,linear-lanceolate, spathulate or obovate-spathulate,gradually reduced upwards. Inflorescence a monochasial cyme,rarely flowers in a dichasial cyme (branches of the dichasium unequal,often pass into a monochasial cyme above).Flowers hermaphrodite,subsessile or pedicellate.Calyx tubular,tubular-clavate or obconical-cylindrical,in fruit clavate with constricted base.Petals bipartite,ligulate.Capsule ovoid, oblong or ovoid-oblong,subsessile or stipitate.Seed with grooved back and excavate face

Lectotype
Type species:S.hirsuta Lag.

Distr. Mediterranean & Orient

Subsection ~~39a.~~ Pubicalycinae Chowdhuri, subsect.nov.

Calyx tubulosus vel tubuloso-clavatus,glanduloso-

puberulus vel pubescens,in fructu clavatus, Capsula ovoideo-oblonga vel oblonga,stipitata.

Type species : S. palistina Boiss. S. hirsuta Lag.

S.nicaeensis All.
S.micropetala Lag.
S.scabriflora Brot.
S.hirsuta Lag.
S.imbricata Desf.
S.mogadorensis Coss.& Bal.
S.palistina Boiss.
S.damascena Boiss.& Gaill.
S.discolar Sibth. & Sm.
S.pompeiopolitana J.Gay
S.cisplatensis Cambess.
S.affinis Boiss.
S.obtusifolia Willd.
S.Schweinfurthi Rohrb.
S.chirensis Rohrb.

Subsection ~~39b.~~ Cinereae (Battand.)Chowdhuri,comb. nov.

Syn.Sect.Stachymorpha subsect.Cinereae Battand. in Battand. & Trabut.,Fl. de l'Alg.,i,131 (1888).

Calyx obconico-cylindricus,in fructu clavatus,puberulus vel glaber.Capsula ovoidea vel ovoideo-oblonga,stipitata.

Type species : S.cinerea Desf. lectotype

S.cinerea Desf.
S.maroccana Coss.
S.cladestina Jacq.
S.sericea All.
S.Kremeri Soy-W.& Godr.
S.canopica Boiss.
S.setacea Vis.

Subsection ~~39c.~~ Nocturnae (Battand.)Chowdhuri,comb. nov.

Syn.Sect.Stachymorpha subsect.Nocturnae Battand. in Battand. & Trabut.,Fl.de l'Alg.,i,132 (1888).

Calyx cylindricus,scabridus,in fructu oblongus.Capsula oblonga,subsessilis.

Type species :S.nocturna Linn.

S.nocturna Linn.

S.reflexa (Linn.)Ait.

Silene. Syn. Sect. Stachymorpha Otth in DC. Prodr. i ---- .

Section ~~10.~~ Gallicae (Battand.)Chowdhuri, ~~comb. et stat.nov.~~

~~Syn.~~ Sect.Stachymorpha subsect.Gallicae Battand.in Battand. & Trabut.,Fl.de l'Alg.,i,131 (1888).

Herbae annuae,rare biennes,pubescentes,hispido-pubescentes, rarius viscoso-hispidulosae.Radix tenuis.Caudex brevis,foliosus, ramosus.Caules erecti vel ascendenti,ramosi,foliosi.Folia inferiora rosularia,oblongo- vel lanceolato-spathulata;superiora lanceolata vel lineari-lanceolata,superne gradatim reducta.Flores in cincinnis, rarius in dichasia dispositi;dichasii ramis valde inaequalibus; flores plerumque breviter pedicellati,raro inferiores calyce longi pedicellati.Calyx cylindricus,in fructu ovoideus,ad apicem contractus. Petala integra vel emarginato-biloba,ligulata,subsessiles.Semina dorso canaliculata. ~~Type species~~ Lectotype :S.gallica Linn.

S.disticha Willd.	S.gallica Linn.
S.bellidifolia Jacq.	S.Giraldii Guss.
S.ramosissima Desf.	S.cerastioides Linn.
	S.calycina Salz.

Dist: Mediterranean (one species cosmopolitan)

Section ~~11.~~ Dipterospermae (Rohrb.)Chowdhuri, ~~comb.et~~ stat.nov.

Syn. Sect.Cincinnosilene series Dipterospermae Rohrb.,Monogr Sil., 69 (1868).

Annual herbs,puberulent or pubescent,sometimes glabrescent. Stem erect or ascending,branched in the lower portion,leafy.Caudical and lower cauline leaves rosulate,linear-lanceolate or lanceolate or ovate-lanceolate;other cauline leaves similar,gradually reduced above.Inflorescence a monochasial cyme,rarely a dichasium (branches

of the dichasium unequal).Flowers hermaphrodite,lower ones pedicellate.Calyx obconical-cylindrical or oblong-clavate,in fruit clavate or obovate-turbinate rarely campanulate,sometimes slightly inflated.Petals bipartite,ligulate.Capsule ovoid or subglobose,stipitate,included.Seed compressed,reniform;face flat and back deeply & acutely grooved with two wavy wings

Type species : S.colorata Poir.

S.glauca Pourr. S.glaberrima Faur. & Maire

S.glabrescens Coss. S.colorata Poir.

S.longicaulis Pourr. S.apetala Willd.

S.decipiens Barcelo

Section 42. Conosilene Rohrb.,Monogr. Sil., 67 (1868).

Syn. Sect.Conoimorpha Otth in DC.,Prodr.,i,367(1824).

Sect.Conoimorphae and Sect.Ammophilae Boiss.,Fl.Or., i,568 (1867).

Gen.Pleconax Raf.,Aut.Bot.,24 (1840).

Annual herbs,pubescent or glandular-puberulent,usually viscid above.Stem erect or ascending,seldom prostrate,leafy,branched. Leaves oblong- or linear-lanceolate or lanceolate;upper gradually reduced.Inflorescence a dichasial cyme.Flowers hermaphrodite, pedicellate.Calyx cylindrical- or oblong-conical,with 20-30 or 60 parallel nerves,in fruit ovate-conical,often inflated at the base. Petals entire or bipartite,ligulate;claw & filaments smooth or pilose.Capsule ovoid-conical or flask-shaped,subsessile.Seed with flat face and grooved back. Type species : S.conica Linn.

S.ammophila Boiss. S.conica Linn.

S.coniflora Nees S.conoidea Linn.

S.subconica Friv. S.lydia Boiss

S.Sartorii Boiss. & Heldr.

S.amphorina Pomel

S.Temskyana Freyn & Sint.

S.macrodonta Boiss.

S.multinervia Wats.

Distn. Mediterranean (2 species circumboreal)

KEY TO THE SECTIONS

Ia. Calyx 20-30- or 60-nerved,ovate- or cylindrical-conical;nerves more or less prominent,parallel,greenish;inflorescence a dichasial cyme,seldom passing into a monochasial cyme; plants annual .....42. Conosilene morpha

Ib. Calyx usually I0- seldom 20-nerved,not conical;nerves usually reticulately anastomosed,sometimes more or less simple and thick; when 20-nerved,nerves not parallel,neither plants annual nor calyx conical at or after anthesis;plants perennial to annual:

2a. Inflorescence racemosely paniculate,seldom passing into a (↓ 112) dichasial cyme.Lateral cymules usually long,opposite, seldom alternate,3-5--flowered,rarely reduced to I flower; sometimes cymules short,bearing I-3 flowers,or a cluster of flowers at nodes in a pseudo-verticillaster,rarely main axis very much condensed bearing flowers in a capitate cyme; sometimes entire inflorescence reduced,I- or 2-flowered; plants perennial with suffruticose base,sometimes caespitose:

3a. Calyx membraneous,sometimes subcoriaceous,pubescent or glandular-puberulent or glabrescent;base umbilicate or truncate:

4a. Inflorescence racemosely paniculate,lax or more or less congested,not pseudo-verticillate or capitate; petal bipartite or multipartite,sometimes entire, ligulate:

5a. Main axis of the inflorescence long;lateral cymules opposite:

6a. Inflorescence usually a spreading panicle;cymules long, spreading,seldom diffuse with 3-7 (rarely I) flowers;if inflorescence raceme-like (S.olympia Boiss. & S.saxatilis Sims),then claw and filament ciliate:

7a. Caudical and lower cauline leaves rosulate,persisting in flowering shoots;other cauline leaves usually reduced, often remote,sometimes many,large,conspicuous,gradually reduced above,sometimes with sterile leafy shoots in axils;leaves linear,lanceolate to oblong-lanceolate or ovate to ovate-lanceolate;if linear-subulate (S. struthioloides Gray),then leaves glabrous,more or less coriaceous,calyx more than I0.0 mm. in length:

8a. Calyx obconical or obconical-cylindrical,firm, glabrescent,seldom with nerves scabrous;flowers rather small,erect or nodding at anthesis;filaments pilose at the base (except S.parrowiana Boiss. & S.Manissadjiana Freyn);claw ciliate;~~panicle passing into a raceme~~

.....4.Lasiostemones 143

8b. Calyx cylindrical-clavate or clavate or broadly cylindrical,membraneous,thin,pubescent,glandular-puberulent,often viscid,rarely glabrescent;flowers large;filaments smooth,if pilose at the base then limb multipartite:

9a. Flowers nodding at anthesis;claw smooth;limb

bipartite (except S.stellata Ait.-multipartite);filaments smooth ..... 3.~~Viridiflorae~~ Siphonomorpha

9b. Flowers erect at anthesis;claw smooth or ciliate;limb bipartite multipartite or entire;filaments smooth or pilose:

10a. Calyx cylindrical-clavate or clavate,in fruit usually more or less constricted below the capsule;claw exauriculate or nearly so,smooth or ciliate;filaments glabrous;plants of the Old World ..... I.Paniculatae

10b. Calyx broad,cylindrical or cylindrical-campanulate,in fruit not constricted below the capsule;claw usually auriculate and ciliate;filaments usually pilose;plants of the New World 2.Occidentales

7b. Caudical and lower cauline leaves small,rosulate,more or less ephemeral;other cauline leaves several,conspicuous, gradually reduced upwards,fasciculate;leaves linear-subulate,canescent-puberulent.Calyx 3.0 - 4.5 mm. long, ovate,subcoriaceous; branches of the panicle and pedicels slender;limb entire,eligulate 6.Tunicoideae

6b. Inflorescence narrowly racemiform;cymules short ,ascending,1-2-or 3-flowered,lower 1-3 pairs often more or less long,3-5- or 7-flowered. Calyx subcoriaceous,glabrous or puberulent;petals usually yellowish, bipartite:

IIa. Caudical & lower cauline leaves large,rosulate,persistent in the flowering shoots;other cauline leaves much reduced, remote,often bract-like:

I2a. Calyx subcoriaceous,cylindrical-clavate or clavate, adpressed in fruit;claw smooth (except S.viscosa (Linn.)Pers.);filaments generally smooth

.....7.Chloranthae

I2b. Calyx membraneous,campanulate or ovate-campanulate, not adpressed in fruit;claw ciliate;filaments smooth or pilose

.....9.Graminifoliae

IIb. Caudical & lower cauline leaves small,usually disappearing from the old plant;other cauline leaves conspicuous,more or less closely spaced,with short sterile leafy shoots in axils.Calyx slightly inflated at or after anthesis

.....8. Tataricae

5b. Main axis of the inflorescence short;lateral cymules opposite, or often alternate,more or less erect,3-5(7)-flowered (rarely I-flowered),lax or more or less congested.Pedicels short or long,with two bracteoles on the upper part:

I3a. Plants generally tall,usually with suffruticose base; caudical & lower cauline leaves usually small,often disappearing in the old plant;other cauline leaves usually large,conspicuous,gradually reduced above:

I4a. Cymules lax;flowers hermaphrodite,usually large & conspicuous,pedicellate;calyx cylindrical-clavate,

with more or less prominent nerves;claw smooth and often auriculate

..... I5. Suffruticosae 249

I4b. Cymules congested;flowers hermaphrodite or unisexual (dioecious,monoecious-polygamous),rather small,subsessile; calyx cylindrical- or oblong-clavate with prominent or obscure nerves;claw ciliate or smooth,exauriculate:

I5a. Calyx cylindrical-clavate or clavate,usually not conspicuously inflated in fruit;capsule many-seeded,dehiscent

..... I2.Spergulifoliae 225

I5b. Calyx oblong,becoming ovate or suglobose & much inflated in fruit;fruit I-2-seeded,indehiscent

..... I3.Ampullatae

I3b. Plants dwarf,caespitose;caudical and lower cauline leaves large,rosulate,persistent in the flowering stem;other cauline leaves gradually reduced upwards or abruptly reduced and bract-like.Flowers hermaphrodite and pedicellate

..... I4.Caespitosae 243

4b. Inflorescence simple or compound;lateral cymules very short, forming clusters of flowers at nodes,or main axis (becoming very short) bearing flowers in a capitate cyme;petals entire, usually eligulate.Plants dioecious-or monoecious-polygamous, seldom with hermaphrodite flowers:

I6a. Caudical and lower cauline leaves large,rosulate;other

cauline leaves gradually reduced upwards, sometimes all reduced and remote; calyx obconical, adpressed in fruit. Stem simple or branched .....I0. Otites (214)

I6b. Caudical and lower cauline leaves usually rather small; other cauline leaves large, conspicuous, with short, sterile, leafy shoots in axils; calyx clavate, usually slightly inflated at or after anthesis .....II. Holopetalae (222)

3b. Calyx coriaceous, glabrous, often glaucous, clavate or cylindrical-clavate, base pseudo-umbilicate with annular ring. Inflorescence a panicle, sometimes reduced; plants glabrous, seldom puberulent below ..... 5. Sclerocalycinae (163)

2b. Inflorescence not a panicle; flowers in a dichasial or monochasial cyme:

I7a. Inflorescence a dichasial cyme, lax or more or less congested; branches of the dichasium equal or unequal, sometimes passing into a monochasial cyme especially in the upper part of the inflorescence, often with flowers solitary or 2-3 in a simple dichasium. Calyx usually I0- (sometimes 20-) nerved, simple or inflated; plants perennial to annual:

I8a. Calyx conspicuously inflated at anthesis or nearly so, I0-20-nerved; nerves reticulately anastomosed; plants perennial:

I9a. Calyx pubescent, glandular-puberulent, often

more or less hirsute and viscid,I0-20-nerved:

20a. Caudex stout,strongly woody,erect,in plants more than one year old covered with bases of old leaves or showing leaf scars,leafy at crown;limb I-2 cleft;plants dwarf:

21a. Calyx campanulate or ovate-campanulate;limb bipartite,often with two lateral teeth on the side;claw auriculate (except S.Elizabethae Jan.); stem scapiform or leafy,few-I-flowered;cauline leaves oblong-linear,lanceolate or ovate-lanceolate,base not cordate;caudex branched,each branch with I-5 stems I6.Odontopetalae 271

21b. Calyx cylindrical- or oblong-clavate;limb bipartite (except S.lazica Boiss.-quadripartite) without lateral teeth;claw exauriculate;stem leafy,many-flowered;cauline leaves ovate or lanceolate with cordate base,large and conspicuous;caudex stout,simple or sparingly branched,each branch many-stemmed I7.Cordifoliae 286

20b. Caudex slender,often procumbent or ascending;stem leafy,branched above;limb multipartite.Cauline leaves large,gradually reduced upwards I8.Fimbriatae 288

I9b. Calyx glabrous and glaucous,I0-20-nerved;if puberulent, limb emarginate.Caudex slender;stem branched usually from

the middle upwards;cauline leaves large and conspicuous, gradually reduced above,glabrous,rarely puberulent or hirsute;limb emarginate to deeply cleft;ligules usually small

..... I9.Inflatae (294)

I8b. Calyx not inflated at anthesis,I0-nerved;nerves reticulately anastomosed,sometimes more or less simple and prominent;plants perennial,biennial or annual:

22a. Plants perennial;stems with I-2 or 3 (sometimes many) flowers;alpine or subalpine:

23a. Caudices stout,strongly woody,erect,in plants more than one year old covered with bases of old petioles or (in old part)showing leaf scars;caudical and lower cauline leaves large,rosulate;other cauline leaves reduced,often remote;stem branched above or simple,rarely subscapiform.Flowers small,usually many,sometimes reduced to one

.....20.Brachypodae (309) s Pinnatifidae o Auriculatae

23b. Caudices slender,long,prostrate or ascending,or more or less erect,usually covered with leaf bases; cauline leaves usually gradually reduced upwards, sometimes conspicuous,or reduced and bract-like; stem leafy,sometimes scapiform,I-few-flowered:

24a. Flowers small,many in a typical,lax dichasium; stem slender,branched,leafy,glabrescent;calyx obconical or shortly clavate

25a. Seeds not crested on the dorsal surface

.....27.Brachyanthae Rupifraga

25b. Seeds crested on the dorsal line Heliosperma

(Macranthae)

24b. Flowers usually large or nearly so, seldom small, solitary or 2-5 in a dichasium; calyx cylindrical-clavate, clavate or campanulate. Stem leafy or scapiform, sparingly branched above:

25a. Calyx campanulate, 4.0 - 8.0 mm. long, glabrous; petals entire or emarginate. Capsule subsessile .....25. Nanosilene

25b. Calyx cylindrical-clavate or clavate, rarely oblong or ovate-campanulate, calyx puberulent or glandular-puberulent; limb bipartite:

26a. Leaves linear-subulate, triquetrous, apex indurate, usually pointed, straight or falcate; claw auriculate .....21. Pinifoliae (319)

26b. Leaves neither linear-subulate nor triquetrous, [or if linear-subulate (S. Urvillei Schott) then leaves fasciculate, not triquetrous and claw exauriculate]:

27a. Claw with conspicuous auricles (except S. microphylla Boiss.); plants hairy. Stem subscapiform or leafy, 1-2-flowered, rarely 3-5-flowered; cauline leaves gradually reduced above, sometimes abruptly reduced and bract-like .....22. Auriculatae (339)

27b. Claw without an auricle; or if auriculate, plants glabrous:

28a. Caudex slender,ascending or erect,branched,more or less compact,often suffruticose;stem subscapiform or leafy:

29a. Leaves linear or linear-lanceolate or lanceolate; limb bipartite;claw smooth or nearly so;plants dwarf and caespitose;plants from the Old World 24.Macranthae 370

29b. Leaves lanceolate or oblanceolate;limb bipartite or quadripartite,when bipartite lobes emarginate or with lateral outgrowths;claw ciliate;plants from the New World 23.Quadrilobatae

28b. Caudex slender,leafy,erect or more or less prostrate, not compact,sparingly branched;leaves ovate or ovate-lanceolate,often 3-5-nerved,sometimes fasciculate;stem leafy,usually tall 26.Cucubaloideae 380

22b. Plants annual,biennial,rarely perennial with stem always many-flowered;plants from the lower altitude or sea side; caudex short,usually not strongly woody:

30a. Dichasium condensed into a capitate or umbellate cyme; petals entire or emarginate;plants glabrous and glaucous .....28.Compactae (384).

30b. Dichasium not a capitate or umbellate cyme;flowers in a dichasial cyme;petals usually bipartite;plants pubescent,

glandular-puberulent or often hirsute,viscid:

3Ia. Plants succulent,maritime or psammophytic;stem prostrate or ascending,branched,leafy;dichasium passing into a monochasium; leaves fleshy;plants annual or perennial 29.Succulentae (389)

3Ib. Plants not succulent or maritime;stem usually erect, branched and leafy;branches of the dichasium (inflorescence) equal or unequal,often passing into a monochasial cyme especially in the upper part;leaves usually not fleshy;plants mostly annual,rarely biennial or perennial:

32a. Seed deeply reniform,compressed with flat face,back deeply and acutely grooved between two wings;calyx slightly inflated in fruit;capsule sessile 31.Saponariae

32b. Seed widely reniform,scarcely compressed,never with two wings;calyx not inflated in fruit;capsule subsessile or stipitate:

33a. Calyx apex not contracted in fruit:

34a. Plants rigid with stiff and filiform branches & pedicels;branches of the dichasium (inflorescence) equal;seed with flat face.Cauline leaves usually fasciculate 32.Rigidulae (403)

34b. Plants tender,scarcely rigid;branches of the dichasium (inflorescence) equal or unequal,often

passing into a monochasial cyme;seed with concave or convex face 33.Atocion 419

33b. Calyx apex contracted in fruit:

35a. Calyx glabrous and often glaucous,or viscid;nerves slender,more or less branched and anastomosed; plants glabrous or sparingly puberulent below, always glabrous above .....34.~~Leiocalycinae~~ Behenanthe (436)

35b. Calyx hairy;plants pubescent or glandular-puberulent:

36a. Calyx glandular-puberulent;nerves anastomosed 30.Melandriformes

36b. Calyx scabrous,bristly;nerves thick,greenish, simple,bearing papillae,or bulbous or scaly hairs 35.Lasiocalycinae 451

I7b. Inflorescence a monochasial cyme with the axis simple or I-3-forked below,with or without an alar flower (rarely a dichasium below):

37a. Plants perennial;caudex strongly woody,in plants more than one year old covered with leaf bases or scars 36.Fruticulosae

37b. Plants annual,rarely biennial or short-lived perennial; caudex short,not strongly woody:

38a. Seed widely reniform,sometimes more or less

compressed,never with two wings:

39a. Pedicels showing movements at or after anthesis; calyx with prominent,greenish,more or less simple nerves,in fruit constricted below the capsule and apex contracted.Capsule ovoid or ovoid-conical; seed with flat face and grooved back:

40a. Pedicels long,erect or ascending,becoming arcuately erect or deflexed in fruit;calyx oblong-clavate,becoming ovate and inflated in fruit;calyx nerves glandular-puberulent;petals pink 37.Erecto-refractae

40b. Pedicels short,slender,spreading or horizontal at anthesis,becoming more or less stout & erect in fruit;calyx adpressed to the capsule, cylindrical-clavate,becoming ovate-clavate in fruit;calyx nerves with crisp or papillose hairs;petals usually white

.....38.Dichotomae (462)

39b. Pedicels not showing movements;calyx with nerves not so prominent,usually reticulately anastomosed, in fruit constricted,or not constricted below the capsule:

41a. Calyx apex contracted in fruit;capsule ovate-globose,subsessile seldom stipitate

..... 40.Gallicae- Silene (499)

41b. Calyx apex not contracted in fruit; capsule oblong or ovate-oblong, subsessile or stipitate .....39. Scorpioideae (475)

38b. Seed deeply reniform with flat face, back deeply and acutely grooved between two wavy wings .....41. Dipterospermae (510)

SECTION I. PANICULATAE

The 29 species of this section are characterized by the branched and woody caudex, bearing I or several stems; the caudical leaves large, petiolate, rosulate, linear- to oblong-lanceolate, ovate- or obovate-lanceolate; cauline leaves usually reduced, seldom large and conspicuous; the inflorescence a panicle; cymules usually opposite, 3-7-flowered, seldom plants I-3-flowered; flowers erect; claw and filaments smooth, and the capsule stipitate.

The species of this section fall into 3 subsections on the basis, primarily, of habit of the plant and the degree & number of incision of limb of petal and, secondarily, of leaf size, nature and degree of reduction of cauline leaves, and nature of stem (simple or branched).

Subsection Patulae contains I9 species which are usually tall plants with a rosette of basal leaves, cauline leaves reduced, stem usually branched above forming a paniculate inflorescence; cymules generally long and spreading; limb bipartite, ligulate; capsule ovoid-oblong.

Subsection Sclerophyllae contains 5 species mainly from Japan, China and Hawaiian Islands which are low in stature than those in the preceeding subsection and have less branched stems; cauline leaves conspicuous, fasciculate and more or less coriaceous; limb of the petal entire or emarginate, ligulate and capsule ovoid. Plants glabrous; and the imflorescence is not so regular as in the previous group.

Subsection Laciniatae contains 5 species from Siberia and China which are characterized by the plant of medium height with branched and puberulent stems; cauline leaves

usually conspicuous;limb laciniate,eligulate;capsule ovoid-oblong.

Key to the subsection & Oriental species.

Ia. Inflorescence a panicle;cymules opposite,spreading,3-7-flowered; limb bipartite,ligulate;leaves not coriaceous,puberulent .....Subsection IA.Patulae

2a. Plants polycarpic;panicle with long cymules;calyx more than I.0cm. in length;capsule as long as or I½X as long as anthophore:

3a.Limb cuneate,bipartite beyond middle into oblong-obovate lobes;flowers white;anthophore hairy:

4a. Cauline leaves reduced,oblong- or linear-lanceolate, I-nerved,usually not fasciculate;claw exserted;plants below 80 cm. in height .....I. S.italica

4b. Cauline leaves conspicuous,ovate-lanceolate,gradually reduced above,fasciculate,3-nerved;claw equalling calyx;plants above 80 cm. in height ..... 2. S.splendens

3b.Limb obovate-cuneate,bipartite toI/3 to I/5 of its length into obovate or oblong lobes;flowers usually pink;anthophore smooth or scabrous-puberulent:

5a. Calyx clavate with lanceolate acute teeth;limb bipartite to I/5 of its length;plants pubescent; anthophore scabrous-puberulent 5.S.Pichleri

5b. Calyx cylindrical with ovate or triangular obtuse

teeth;limb bipartite to I/3 of its legth; plants glabrous;anthophore smooth

.....4. S.fruticosa

2b. Plants monocarpic;panicle with cymules usually short forming pseudo-verticellaster at nodes; calyx less than I.0 cm. in length;capsule 3-5 times as long as anthophore

.....3. S.gigantea

Ib. Inflorescence a panicle,not so regular;cymules opposite or alternate,I-3-flowered;limb entire or laciniate; leaves coriaceous or thin:

6a. Limb entire or emarginate,ligulate;leaves coriaceous; capsule ovoid

.....Subsection IB.Sclerophyllae

6b. Limb laciniate,eligulate;leaves not coriaceous; capsule ovoid-oblong

.....Subsection IC.Laciniatae

I. S.italica (Linn.)Pers.,Syn. Pl.,i,498 (I805);Boiss.,Fl. Or.,i, 63I (I867);Rohrb.,Monogr. Sil.,2I8 (I868)- Reichb.,Ic. Fl. Germ. Helv.,vi, t.295,fig.5II0 (I844);Reichb.,Pl. Crit.,iii,fig. 465 (I825);Sibth. & Sm.,Fl.Graeca,v, t.429 (I825);Sowerby,Eng.Bot.,ii,t.208 (I885).

Syn. Cucubalus Italicus Linn.,Sp.Pl.,II.593 (I762);Syst. I0, I030 (I759).
Cucubalus silenoides Vill.,Hist.Pl.Dauph.,iii,6I4 (I789).
Silene latifolia Poir.,Voy. Barb.,,ii,I65 (I789);non Hornem (I8I9);non Gray (I82I);non Hayek (I902);non Rendle & Britton (I907).
S. patula Desf.,Fl.Atl.,i,356 (I789);non Linn. (I802).
Viscago clavata Moench,Method.,704 (I794).
Silene viscosa Schleicher,Cat. Pl. Hel.,24 (I800);non Pers (I805).
S.bassanensis Sternb.,Riese Rhet.Alp.,40 (I806).
Viscago italica Hornem.,Hort.Hafn.,4I0 (I8I3).
Silene pedicellata Poir. in Lmk.Encycl.,Suppl.,v,I50(I8I7).
S.Italica var.rubriflora Otth in DC., Prodr.,i,382(I824).
S. ocimoides Desf.,Cat.Hort.Paris,3.I84 (I829).
S.fistulosa G.Don,Gen.Syst.,i,405 (I83I).
S.patens Pecte in Engl. Bot.,Suppl.,t.2748(I834).
S.nemoralis Maly,Enum.,306(I848);non W. & K.(I8I2).
S.catholica Willk. in Flora,xxxiv,600(I85I);non Ait(I8II); non Otth (I824);non Ledeb.
S.nemoralis Griseb.,Spicil.,i,I72(I843).
S.Italica var. laxiflora Neilr.,Veg.Verh.Croat.,206(I868).
S.paradoxa var.maritima Reverchon,Sched.Pl.Sard.,I80(I88I).

Perennial,24.0 -80.0cm. tall.Root deep-seated,woody,with a multicipital crown.Caudex erect or decumbent,sometimes prostrate, 3.8-8.0 cm.long,2.0-3.5 mm. wide,branched,bearing adventitious roots and with marcescent shreds of old petioles.Stem erect,terete, purplish from the base upwards,usually simple below,becoming branched in the region of inflorescence,rarely branched throughout, tomentellous-canescent to scabrous-puberulent below with white spreading or retrorse hairs,nearly glabrous and viscid above;nodes more or less swollen,often hairy;middle internodes 4.3-I2.5 cm.long. Caudical and lower cauline leaves rosulate,petiolate,5.0-I3.I cm. long,0.7-3.0 cm. wide,ovate- ,oblong- or lanceolate-spathulate, attenuated in petiole,base with hyaline ciliate margin;apex acute, obtuse or mucronate,puberulent or subtomentellous;other cauline leaves sessile,3.7-9.0 cm. long,4.5 -I8.0 mm.wide,oblong- or linear-lanceolate,sometimes linear,acute,base ciliate,obscurely 3-nerved,puberulent to scabrous.Inflorescence usually a panicle, seldom raceme-like,cymules usually long,opposite,ascending,3-5-flowered,sometimes short,few paired,I-2-flowered;seldom plants with I-3 flowers.Bracts and bracteoles equal,ovate-lanceolate, acuminate,base 3-nerved,with hyaline ciliate margin,sparingly puberulent.Pedicels of terminal flowers 2.5-7.0mm. long,and those of lateral ones 8.0-I3.0 mm.long,erect or ascending.Flowers erect, hermaphrodite.Calyx I.5 -2.I cm.long,3.5-4.5 mm.diam.,cylindrical-clavate,umbilicate,with I0 purplish anastomosed nerves,glandular-puberulent,in fruit clavate with constriction below the capsule; teeh 2.0-2.5 X I.3-I.8 mm.,ovate,obtuse,seldom emarginate,with hyaline ciliate margin.Petal white,often dorsal surface with pinkish or greenish nerves,I.6-2.05 cm.long;claw I.I-I.35 cm.long,

exserted,smooth or ciliate;auricles usually obscure,sometimes small, obtuse;limb 5.0-7.0 X 3.0-5.0 mm.,obovate-cuneate,bipartite to 2/3 its length into oblong-obovate lobes;ligules two,minute,sometimes represented by small thickenings.Filaments smooth,exserted. Styles 3,exserted,hairy.Anthophore 7.0-II.0 mm.long,hairy.Capsule 9.0-I3.5 X 5.0-6.5 mm.,oblong-ovoid,nearly as long or I½X as long as anthophore,included.Seed chocolate brown,I.0-I.3 mm.long,with flat face and grooved back,granulate.Hs. or Chh.

Linnaean specimen- In Italia (L!)

TURKEY - Prov.Erzincan:Sipikor dag,5-7-I889,Sint.II66.Prov.Trabzon/Gumusane:Zigana Pass,I680m.,I2-7-I934,Balls1665.Prov.Erzurum: Erzurum,Zohrab I60.Prov.Kastamonu:Tosya,Giaur dag,I0-6-I892,Sint. 4I89.Prov.Amasya,Manisad.I77.Prov.Rize:Cimil,2000m.,July I866,Bal.; Hanse Koy,I200m.,I4-6-I933,Balls387.Armenia,sine loco,Szovits 52; ibid.,Calv. & Zohrab;Kutul Tepsi,I5-7-I947,Heilb. & Basar. Prov. Izmit:Yalova,June I945,Basar. Prov. Bursa: Ulu dag,29-6-I944,Basar.; Ulu dag,Elma Cukur,28-6-I944,Basar. Ormani,2I-7-I947,Heilb& Basar. Prov.Hatay:Nur daglari,above Iskenderun,Montb..Cilicia, Kalkberge,May I896,Siehe 98.Prov.Antalya:Elmali,I0-5-I868,Bourg.. Prov.Burdur:Burdur,May i845,Heldr..Caria,Montb.;ibid. yr.I843 Pinard. Prov.Izmir:izmir,I6-5-I854,Bal.;Bergema,Akropol,22-4-I950,Heilb.. Prov.Istabul:Belgrat forest,4-6-I940,Kasap.

SYRIA- Mt.Nusairy,Bahmra,I5 miles,E of Ladikie,300m.,April I909, Harad.2798 ;Anti-lebanon-Baynu,Wabi Shut,I050m,I4-6-I943,Davis 633I.

IRAN - I2m. W.of Astusa,900m.,I6-6-I929,Cow. & Darl.250I;Kisil Arwat,Karakala valley Joldere,26-5-I90I,Sint.I823.

AEGEAN- Lesbos -Mt.Lepetymnos,400m.,I5-5-I934,Rechinger 58I3 ; Olympus,Ajassoss,400m.,I9-5-I934,Rechinger 5609.

Geogr. Morocco,Algeria,Spain,Italy,Bulgaria,Hungary,Greece,Turkey, Syria,Caucasus and Iran.

Habitat. Hills and fields,alt. 400 -2000m. .Fl.-May -July

S.italica is a plant of considerable polymorphy in Europe. A number of subspecific forms have been proposed,based chiefly on the indumentum,shape and size of leaves,and congestion of

flowers on the inflorescence.So far as the Oriental material is concerned,there are no geographically distinct races recognizable. The density,rarely the nature of indumentum shows considerable variation as the result of ecological conditions.The height of the plant,size and length of the inflorescence and number & congestion of flowers in the cymules vary without any corelation with the geographical distribution.The caudical leaves which are normally lanceolate-spathulate become ovate- or obovate-spathulate by a change in the apex.

2. S.splendens Boiss.,Fl.Or.,i, 631 (1867);Rohrb.,Monogr.Sil., 218 (1868).

Perennial,80.0 -108.0 cm. tall.Caudex 5.0 -12.0 cm. long, 5.0- 7.5 mm. wide,erect or arcuate,sparingly branched,covered with the bases of old leaves.Stem erect,terete,leafy,usually purplish from the base upwards,generally simple below,branched from the middle upwards,densely retrorse puberulent and hirtellous below, becoming glabrous and viscid above;nodes more or less swollen;middle internodes 5.2 -7.5 cm. long.Leaves monomorphic,3.5 -8.7 cm. long, 1.0- 2.3 cm. wide,ovate-lanceolate,acuminate,3-nerved at the base, puberulent;caudical ones petiolate;lamina attenuated into the petiole,base with hyaline ciliate margin;cauline leaves sessile, conspicuous,more or less fasciculate,glabrous.Inflorescence a panicle;cymules opposite,ascending,3-7-flowered.Bracts and bracteoles equal,linear-lanceolate or linear,3-nerved,with hyaline ciliate margin,puberulent.Pedicels 3.0-6.5 (10.0) mm. long,erect or ascending,glandular-puberulent.Flowers hermaphrodite, erect.

Calyx 1.9- 2.1 cm. long,3.0-3.5 mm.diam.,cylindrical-clavate, truncate-umbilicate,with 10 purplish anastomosed nerves,glandular-puberulent,in fruit clavate with the base narrowed below the capsule; teeth 1.3-1.5 X 1.3-1.5 mm., ovate,often with constricted base, obtuse,with hyaline ciliate margin.Petal white,1.5-1.84 cm.long; claw 9.0 -11.0 mm. long,equalling calyx,smooth;auricles obtuse, round or obscure;limb 6.0-7.4 X 3.0-3.5 mm.,cuneate,bipartite into obovate lobes;ligules two,minute.Filaments exserted,smooth.Styles 3, exserted,smooth.Anthophore 7.0-10.0 mm.long,hairy.Capsule 8.0-11.0 X 4.5-6.0 mm.,ovoid,as long as anthophore,included.Seed brown,0.6-1.0 mm.long,with flat face and grooved back,granulate. Hp. or Chh.

Type- Turkey-in valleculis umbrosis subalpinis Phrygiae prope Ouchak;Bal. 1312 [holo. G;iso. K!,BM!]

TURKEY -Lydia,Mt.Mesogis above Tire,200-300m.,14-6-1906,Bornm.9130.

Geogr. Endemic to Turkey.

Habitat - Subalpine,alt. 200-300m..Fl.-June & July.

S.splendens Boiss.,only known from the type locality,is closely related to S.italica (Linn.)Pers.,but is very distinct from it in the numerous,conspicuous and fasciculate cauline leaves which are ovate-lanceolate and 3-nerved,the claw equalling the calyx,and the plant taller than in S.italica

The seeds were incorrectly described by Rohrbach and Williams,who described them being flat,without a grooved back.

3. S.gigantea Linn.,Sp.Pl. ed.I. 418 (1753).

Perennial,monocarpic,seldom biennial,6.0-10.0 dm.tall. Root woody,deepseated with a simple,rarely 1-2-forked crown.Caudex 1.0-3.0cm.long, 8.0-12.0 mm.wide,erect,simple,covered with bases of old old leaves.Stem erect,terete,simple below,branched above,especially in the region of inflorescence,grey-puberulent or more or less tomentose below,becoming glabrous and viscid above;middle internodes 5.3-10.3 cm.long.Caudical and lower cauline leaves rosulate,petiolate, 4.0-16.3 cm. long,1.0-6.0 cm. wide,obovate- or ovate-spathulate, attenuated in petiole,base with hyaline ciliate margin;apex obtuse or mucronate;other cauline leaves sessile,3,3-12.2cm. long,0.8-3.0 cm. wide,oblong-spathulate,lanceolate or linear-lanceolate,tapering towards the base,acute ;all leaves pubescent or subtomentose. Inflorescence a panicle;cymules opposite,long or short,5-7-flowered. Bracts and bracteoles equal,ovate,acute,with hyaline ciliate margin, with the pedicel glandular-puberulent.Pedicels 7.0-10.0 mm.long, viscid.Flowers hermaphrodite,erect.Calyx 8.0-10.0 mm.long,2.5-3.0 mm. diam.,cylindrical-clavate,truncate-umbilicate,with 10 anastomosed nerves,viscidly glandular and puberulent,in fruit clavate with constriction below the capsule;teeth 1.3-1.8X 1.3-1.5 mm.,ovate obtuse with hyaline ciliate margin.Petal pink,pale yellowish green, 1.0-1.3 cm.long;claw 6.0-8.5 mm.long,equalling calyx,exauriculate, smooth or ciliate;limb 4.0-4.5 X 1.3-1.5mm.,cuneate or obovate-cuneate,bipartite into oblong or obovate-oblong lobes;ligules absent or minute.Filaments exserted,smooth.Styles 3,exserted,smooth. Anthophore 2.0-4.5 mm.long,hairy.Capsule 8.0-10.0 X 6.0-7.0mm., ovoid,3-5 times as long as anthophore,included.Seed dark brown,

I.5-2.3 mm.long,with flat face and grooved back,granulate. Ch.or Hs.

Key to the varieties.

Caudical leaves ovate- or obovate-spathulate;cauline leaves oblong-spathulate,more or less tomentullose; cymules short,forming pseudo-verticellaster cymes;calyx glandular-puberulent ..... i.var.gigantea

Caudical leaves spathulate-lanceolate or oblong-spathulate; cauline leaves lanceolate,scabrous-puberulent;cymules more or less long,loose;calyx puberulent,sparingly glandular,sometimes glabrous .....ii.var.viridescens

i. var. gigantea. Boiss.,Fl.Or.,i,645 (I867);Rohrb.,Monogr.Sil., 203 (I868)-Sibth. & Sm.,Fl.Graeca,v,t.432(I825).

Syn. Viscago gigantea Moench,Method.,705 (I794).

Plant densely pubescent or tomentulose,greyish,becoming more or less glabrous and viscid above.Caudical and lower cauline leaves ovate- or obovate-spathulate,pubescent,usually dorsal surface tomentose;cauline leaves oblong-or lanceolate-spathulate.Inflorescence a panicle;cymules short,opposite,forming pseudo-verticellaster at the nodes.Pedicels short.Calyx glandular-puberulent.

Linnaean specimen-In Lusitania ? [Hort.Cliff-BM!]

TURKEY- Prov. Izmir; Izmir,Boiss..Prov. Antalya: Deliktas Sahil, 26-5-I950,Heilb. & Atilla.

AEGEAN- Samos. Pyrgos,30-4-I940,Davis I632.

Chios - Mt.Plaka above Karies,600m.,14-5-1934,Rechinger5408.

Carpathos -Lostos,600m.,Davis 18064.

Rhodes -Mt.Prophet Ellas,nr. Salakos,11-5-1935,Rechinger. 7160.

CYPRUS - St.Hilarion,23-5-1941,Davis3626;ibid. 714m.,22-7-1938, Kennedy 1178;ibid. 7-6-1939,Lindberg;ibid. 1-6-1905,Holmboe 878; Yaila (Kyremia range),750m.,23-5-1941,Davis 3603;Mt.Pentedactylos, May 1880,Sint.& Rigo 664.

Geogr. Rumelia,Bulgaria,Greece,Ionian Is.,Aegean Is.,Syria,Turkey and Lebanon.

ii. var. incana (Griseb.) Chowdhuri, comb. nov. ~~viridescens Boiss.,Fl.Or.,i,646 (1867);Williams in Journ. Linn.Soc.,xxxii,158 (1896).~~

Syn. S.italica (L.) Pers. var.incana Griseb.,Spicil.Fl.Rum.Bith.,i,173 (1843).

S.mollissima Friv. Herb ex Rohrb.,Monogr.Sil.,204(1868); non Sibth.&Sm.(1806);non Otth (1824);non Pers. (1805).

S.pseudo-nutans Panc.,Add.Fl.Serb.,116 (1884).

Plant scabrous-puberulent,becoming glandular &viscid above. Caudical and lower cauline leaves spathulate;cauline leaves linear-lanceolate or lanceolate.Inflorescence a panicle;cymules long,loose. Pedicels as long as or longer than calyx.Calyx pubescent,sometimes sparingly glandular,seldom scabrous or glabrous.

Type - In rupestribus Atticae in monte Parnes (Heldr.);Macedoniae (Friv.);insulae Chios (Aucher 473).[holo. G.]

TURKEY -Prov. Antalya:dt.Kemer (Lycia),Teke dag,nr.Ovacik,1200m., 12-7-1949,Davis 15215.Prov.Manisa: Magnesia,Sipylo,June 1855 Bal.

Geogr. Greece,Aegean Is. and Turkey.

= S. gigantea L. var. viridescens Boiss., Fl. Or. i, 646 (1867)

Habitat (of sp.).Rocky places and cliff,alt. 600-I200m..

Fl.-June -Sept.

4. S.fruticosa Linn.,Sp.Pl.ed.I.4I7 (I753);Boiss.,Fl.Or.,i,633 (I867); Rohrb.,Monogr.Sil.,225 (I868).-Sibth. & Sm.,Fl.Graeca, v,t.428 (I825);Fiori & Pao.,Ic.Fl.Ital.,I37-fig. II96 (I899).

Syn. S.fruticosa Linn.,Sp.Pl.ed.I.4I7 (I753);non DC.,Fl.Fr. (I8I5);non Salzm.;non Georgi,

S.carnea Salisb.,Prodr.,30I (I796).

S.nitida Lag.,Gen. Sp.Nov.,I5 (I8I6).

S.agrigentina Loj.in Nat.Sicil.,ii,295 (I883).

Perennial,7.0-3I.0 cm. tall.Caudices several from the crown,erect to ascending,becoming branched and suffruticose,with marcescent shreds of old petioles.Stem erect,ascending or arcuate, terete,simple or branched,leafy,glabrous throughout,sometimes sparingly puberulent below,viscid above,usually glandular-puberulent in the region of inflorescence;nodes more or less swollen;middle internodes I.3-2.7 cm. long.Leaves monomorphic,I.8-6.7 cm.long, 0.6-2.I cm.wide,oblanceolate,linear-oblanceolate or linear-lanceolate,glabrous,sometimes dorsal surface minutely and sparsely puberulent;caudical leaves rosulate,petiolate with lamina attenuated into the petiole,obtuse or mucronate;cauline ones sessile,acute. Inflorescence a panicle;cymules opposite,3-7-flowered.Bracts more or less unequal,linear-lanceolate or ovate-lanceolate,acute to acuminate with hyaline ciliate margin,with the pedicels glandular-puberulent

Pedicels 0.8- 2.5 cm. long,erect or ascending.Flowers hermaphrodite, erect.Calyx I.7-2.5 cm.long,3.5-4.3 mm. diam.,cylindrical with tapering base,umbilicate,with I0 greenish-yellow or pinkish anastomosed nerves,glandular-puberulent and viscid;in fruit clavate with constriction below the capsule;teeth 2.5-3.3 X I.8-2.5 mm., ovate or triangular,often with constricted base,obtuse or nearly so, with hyaline ciliate margin.Petal pink,2.0-3.I9 cm. long;claw I.3-I.65 cm. long,exserted,smooth,exauriculate;limb 7.0-I5.4 X 4.5-6.0 mm., obovate-cuneate,bipartite to ½- I/3 of its length into obovate-oblong lobes;ligules two,I.0-I.5 mm.long,oblong,obtuse, acute or laciniate.Filaments exserted,smooth.Styles 3,exserted, smooth.Anthophore 7.0- I0.0 mm. long,smooth. Capsule II.0-I5.0 X 5.5-7.0 mm.,oblong-ovoid,as long as or some what longer than anthophore,included.Seed dark brown,I.3-I.5 mm.long,with flat face and grooved back,granulate.Ch.

Linnaean specimen -In Sicilia [Hort.Cliff.- BM!]

CYPRUS - Ktima,2I-5-I9I3,Harad.666; ibid.,30m.,2-7-I940,DavisI777; ibid. 7-5-I94I,Davis 3343;ibid. Sibth.; ibid.nr.Paphos,6-6-I882, Ky.662; Famagusta,Kantara,600m.,II-5-I940,Kennedy I570;Kantara, April I937,Chan.238;Drousha (Akamas),600 m.,I-5-I94I,Davis 32II; Kantara Castle, I-3-I94I,Davis2453; Kebir,I50-300 m.,I0-5-I9I2, Harad.279.

AEGEAN - Koss Is. sine loco,3-5-I888,Forsyth 753
Carpathos Is. Olympus,30-5-I883,Pichler;Pigadia,I3-6-I935, Rechinger 8099;sine loco,Forsyth.

Geogr. Sicily,Greece,Is. of Turkish Archipelago,Cyprus.

Habitat -Rocky places and limestone rocks,alt.30-600m.

Fl.-March - June.

5. S.Pichleri Stapf in Denkschr. Akad.Wien.,li,282 (1886).

Perennial ,15.0-27.3 cm. tall.Caudex short,erect, becoming branched and suffruticose,covered with bases of old leaves.Stem erect,terete,leafy,usually simple below,sparingly branched above,seldom branched throughout,densely retrorse-puberulent;nodes more or less swollen;middle internodes 8.0-25.0 mm.long.Leaves monomorphic,1.5-3.7 cm.long, 4.0-9.5 mm. wide, obovate-spathulate to oblanceolate,apiculate or mucronate,1-nerved, ventral surface glabrous,sometimes scabrous,dorsal surface minutely puberulent,especially the midrib,margin serrate-ciliate;caudical and lower cauline leaves petiolate with lamina attenuated into it,base with hyaline ciliate margin;other cauline leaves sessile, gradually reduced upwards,seldom fasciculate.Inflorescence a panicle;cymules opposite,short,1-3-flowered.Bracts and bracteoles equal,linear-oblanceolate to linear,base with hyaline ciliate margin.Pedicels 8.0-13.0 mm.long,erect. Flowers hermaphrodite, sometimes pistillate with aborted stamens.Calyx 1.9-2.1 cm.long, 3.5-4.0 mm. diam.,clavate,truncate-umbilicate,with 10 greenish or pinkish nerves,puberulent;teeth 1.5-2.0 X 1.0-1.3 mm.,lanceolate, acute,with hyaline ciliate margin.Petal 1.7-1.95 cm.long;claw 1.1-1.2 cm.long,slightly exceeding calyx,smooth,exauriculate;limb 6.0-7.5 X 4.0-5.0 mm.,obovate-cuneate,bifid 1/5 of its length;ligules two, 0.7-1.0 mm.long,obovate,obtuse or denticulate.Filaments exserted smooth.Styles 3,exserted,smooth.Anthophore 6.5-7.0 mm. long, scabrous or puberulent.Capsule and seed not seen.Ch.

Type - North Persia,Mt.Elbrus,Pichler [holo. K!]

Geogr.Endemic to Iran,

Habitat - On mountains.

S.Pichleri is closest to S.fruticosa Linn.,from which it is distinguished by the hairy indumentum of the leaves and stem, clavate calyx with lanceolate acute teeth,and the less bifid limb and scabrous or more or less puberulent anthophore.

The species is monomorphic.

SECTION 3. VIRIDIFLORAE

The 13 species of this section are characterized by a woody perennial caudex elongated into a taproot; caudical leaves usually large, rosulate, oblong- or lanceolate-spathulate or linear-lanceolate; and cauline leaves usually reduced, sometimes conspicuous with short sterile leafy shoots in axils; paniculate inflorescence; nodding flowers; smooth claw and filaments. The majority of the species from the Mediterranean countries and e have cylindrical-clavate or clavate calyces and bipartite laminas.

In the two American species the calyx is campanulate or tubular-campanulate; in one of them S. stellata (Linn.) Ait., there are 4 leaves at each node and the lamina is more or less laciniate. In these two characters the latter is quite distinct from the rest of the species of this section.

Key to the Oriental species.

Ia. Plant eglandular; calyx obconical-cylindrical, becoming clavate in fruit; limb obcordate-cuneate; anthophore woolly; leaves oblong-rhomboidal or ovate-spathulate ..... 8. S. galataea

Ib. Plant glandular, atleast in the upper part; calyx cylindrical or cylindrical-clavate, becoming clavate or oblong-clavate in fruit; limb cuneate, not obcordate; anthophore smooth; leaves ovate-lanceolate or linear-spathulate:

2a. Calyx ovate in fruit; leaves ovate-lanceolate; capsule subsessile ..... 6. S. viridiflora

2b. Calyx clavate in fruit;leaves lanceolate or linear-lanceolate;capsule as long as anthophore

.....7.S.leucophylla

6. S.viridiflora Linn.,Sp.Pl.,ed.II,597 (1762);Boiss.,Fl.Or.,i, 634 (1867);Rohrb.,Monogr. Sil.,214 (1868)-Reichb., Ic.Fl.Germ.Helv.,vi,t.293,fig.5104 (1844);Javorky & Csapody,Ic.Fl.Hung., 147-fig.1166 (1930).

Syn. S.viridiflora Linn.,Sp.Pl.ed.,II,597(1762);non Guldenst.; non Stephan;non Georgi ;non Ky.

S.pauciflora Ucria in Roem.Arch.,I.i,68 (1796);non Salzm. (1824);non Kit. (1863);non Tornab.(1890).

S.latifolia Hornem.,Suppl.Hort.Hafn.,49 (1819);non Poir (1789);non Rendle & Britten (1907);non Hayek (1902);non Gray (1821).

S.Hornemannii Steud.,Nomencl.,ed.2,II,584 (1841).

S.catholica Ledeb.,Fl.Ross., (1842).

S.viridiflora var.latifolia Schur,Enum.Pl.Transs.,102 (1866).

S.Webbiana Wall.,Cat,, 627 (1828).

Otites viridiflora Opiz in Lotos,iv,42 (1854).

A tall perennial,75.0- 91.0 cm. high.Caudex short,woody, erect or arcuate,covered with bases of old leaves.Stem erect,terete, leafy,usually simple below,becoming branched above,sometimes branched throughout,greenish,puberulent,viscidly glandular above;middle

internodes 4.3-7.2 cm.long.Caudical and lower cauline leaves rosulate,petiolate,4.5-8.3 cm.long,0.6-2.3 cm.wide,ovate-spathulate to oblong-ovate,attenuated into petiole,base with hyaline pilose margin;other cauline leaves sessile,5.2-6.9 cm.long,I.5-2.8 cm.wide, ovate-lanceolate or ovate;all leaves acute,obscurely 3-5-nerved at base,puberulent.Inflorescence a panicle;cymules opposite,3-7-flowered Bracts and bracteoles equal,lanceolate,acuminate,base with narrow hyaline ciliate margin.Pedicels 0.7-3.5 cm.long,bent down at anthesis,becoming erect in fruit.Flowers hermaphrodite,nodding. Calyx I.5-I.9 cm.long,2.8-3.5 mm. diam.,cylindrical,truncate,with I0 greenish anastomosed nerves,glandular-puberulent,viscid,in fruit ovate with base constricted below the capsule;teeth 2.8-3.3 X I.3-I.8 mm.,lanceolate,acute,with hyaline ciliate margin.Petal greenish, 2.3-2.8 cm.long;claw I.5-I.8 cm.long,exserted,smooth,exauriculate, seldom with minute auricles;limb 8.0-I0.0 X 2.8-3.3 mm.,cuneate bipartite beyond middle into linear-oblong lobes;ligules two,3.0-3.5 mm.long,triangular-lanceolate,acute.Filaments exserted,smooth. Styles 3,exserted,smooth.Anthophore I.5-2.0 mm.long thick,smooth. Capsule 9.0- I3.0 X 4.0-6.0 mm., ovoid,subsessile,included.Seed brown,0.8-I.3 mm.long,with flat face and grooved back,tuberculate. Hp.or Ch.

Linnaean specimen - In Lusitania [L!]

TURKEY- Nur daglari (Mt.Amanus)Kushji dag,I5-I950m.,Aug.I908,Harad. 2515.Mt.Taurus (Cilician),aI838,Ky.79.

Geogr.Portugal,Spain,Italy,France,United Kingdom,Greece,Turkey, Siberia,Caucasus and Himalaya.

Habitat - Woods and on mountains,alt.I5-I950m.

Fl.-June -Aug.

S.viridiflora simulates S.amana Boiss. in habit,general appearance,leaf shape and nature & type of indumentum;but it apparently differs in its ovoid fruiting calyx,conspicuously exserted petal claw,and short anthophore.The calyx,which is cylindrical in flower,becomes ovoid in fruit with a constriction below the capsule;the capsule is ovoid and subsessile.

S.viridiflora has a wide geographical distribution extending from Spain to India.It is now recorded from Turkey for the first time.

I have not seen any specimen of S.amana at Kew or at British Museum;its status needs investigation,since the alleged differences are of doubtful taxonomic value.

7. S.leucophylla Boiss.,Diagn.Pl.Nov.Or.,Ser.I,i,29 (I842);Boiss., Fl.Or.,i,634 (I867);Rohrb.,Monogr.Sil.,2I4 (I868).

Perennial,45.0 -54.0 cm.tall.Caudex 2.5-5.7 cm.long, 5.0-II.0 mm.wide,erect,often arcuate,woody,usually sparsely branched, covered with yellowish bases of old leaves.Stem erect,terete,simple below,more or less branched in the region of inflorescence,greyish, tomentose,becoming pubescent and sparsely glandular above,viscid; middle internodes 3.6-6.9 cm.long.Caudical and lower cauline leaves rosulate,petiolate,2.3-4.5 cm.long,4.0-8.5mm.wide,obovate- or oblong-spathulate,attenuated into petiole,acute,base with hyaline ciliate margin,tomentellose;other cauline leaves sessile,reduced,remote,

I.3-3.5 cm.long,2.5-4.0 mm.wide,linear-lanceolate or linear-spathulate,acute,puberulent.Inflorescence a panicle;cymules few, opposite,I-3-flowered.Bracts and bracteoles unequal,linear-lanceolate,acute,with hyaline ciliate margin.Pedicels 5.0-I5.0 mm. long,bent at anthesis,becoming erect in fruit.Flowers hermaphrodite, nodding.Calyx I.3 cm long,2.8 mm.diam.,cylindrical-clavate,truncate-umbilicate,with I0 pinkish anastomosed nerves,glandular-puberulent, in fruit clavate,with slightly constricted base;teeth I.8-2.0 X I·3-I.5 mm.,ovate,obtuse with hyaline ciliate margin.Petal I.5 cm.long; claw I.0 cm.long,smooth,exauriculate;limb 5.0 X 2.0 mm.,cuneate, shortly bipartite into oblong lobes;ligules two,small,ovate. Filaments equalling calyx and claw,smooth.Styles 3,included,smooth. Anthophore 5.0-7.0 mm.long,smooth.Capsule 8.0-I0.0 X 3.5-4.0 mm., ovoid-oblong,as long as or somewhat longer than anthophore,slightly protruding calyx.Seed dark brown,0.8-I.0 mm.long,with flat or more or less concave face and slightly grooved or flat back,tuberculate. Hs. or Ch.

Type - In monte Sinai.Schimper 297 and35I [holo.G;iso.K!,BM!].

Geogr. Endemic to the area cited above.

Habitat - Rocky sides of mountains.Fl.-May-June.

S.leucophylla appears to be related to S.oreosinaica in the Section Brachypodae the two species being alike in habit: their caudical and lower cauline leaves are rosulate and large,and their cauline leaves are few and reduced in size.But they differ in several respects- S.leucophylla is distinguished from S. oreosinaica by having a panicle of opposite cymules,flowers nodding at anthesis.pedicellate and not congested at the apices of

branches,limb cuneate and shortly bipartite into oblong lobes, and anthophore as long as the capsule.Both the species occur in the same area.

Although S.leucophylla apparently has no immediate relatives in the section,it is probably connected with S.amana Boiss.

8. S.galataea Boiss.,Fl.Or.,Suppl.,I02 (I888);Williams in Journ. Linn. Soc.,xxxii,I73 (I896).

Perennial I3.5 -35.0 cm.tall.Root deepseated,woody,with a multicipital crown.Caudex slender,2.5-I3.0 cm.long,2.0-5.0 mm. wide,prostrate to decumbent,branched,bearing adventitious roots and vegetative buds,covered with bases of old leaves.Stem erect or arcuate terete,purplish,usually simple below,alternately branched above, sometimes branched throughout,puberulent below with dense retrorse hairs,becoming glabrous and viscid above;middle inter-nodes 3.6-8.7 cm.long.Leaves monomorphic,oblong-rhomboidal,ovate-spathulate or ovate-lanceolate,abruptly or gradually acuminate,puberulent;caudical and lower cauline leaves rosulate,petiolate,with lamina attenuated into it,base with hyaline ciliate margin;other cauline leaves sessile, or subsessile.Inflorescence a loose panicle;cymules alternate, I-3-flowered.Bracts and bracteoles ovate,acuminate,3-nerved at base, with hyaline ciliate margin.Pedicels 7.0-I4.0 mm.long,bent down at anthesis,becoming erect in fruit.Flowers hermaphrodite,nodding. Calyx I.25-I.45 cm.long,3.5-4.0 mm.in diam., obconical-cylindrical, umbilicate,with I0 pinkish anastomosed nerves,more or less puberulent, in fruit clavate with constriction below the capsule;teeth 2.0-2.5 X I.8-2.0 mm.,triangular,acute and ovate obtuse alternating,with hyaline ciliate margin.Petal pink,I.2-I.5 cm.long;claw 6.5-9.3

mm.long,slightly exceeding calyx,smooth;auricles obtuse,round sometimes obscure;limb 5.0-6.3 X 3.8-5.0 mm.,obcordate-cuneate, bipartite into I/3 its length into obovate lobes;ligules two, 0.3-0.8 mm.long,triangular,acute.Filaments equalling claw,smooth. Styles 3,exserted,smooth.Anthophore 4.0-7.0 mm.long,hairy.Capsule 7.0-12.0 X 5.0-8.0 mm., ovoid-oblong,as long as or 1½ as long as anthophore,slightly exserted.Seed brown,0.8-1.3 mm.long,with flat face and groovrd back,tuberculate.Hs.

Type - In vineis Cypri circa Galata,Sint.& Rigo 768 [holo.G;iso.K!, BM!]

CYPRUS- Pano,Panagia(Paphos),900m.,8-5-1941,Davis 3380;Trypilos (Paphos forest),1140 m.,17-5-1941,Davis 3490;Stavros,750m.,7-5-1937, Syngr.1596;between Ambelileon and Kambos,15-7-1939,Lindberg; Prodromos,1200m.,30-5-1939,Kennedy 1506.

Geogr. Endemic to Cyprus.

Habitat - In vine yards and fields,alt.750-1200m.

Fl.-May-July.

S.galataea,endemic to Cyprus,is closely allied to S.nutans Linn. but differs from the latter in having oblong-rhomboidal or ovate-spathulate leaves those are abruptly acuminate,branches and pedicels slender,and a long anthophore.It differs from S.nutans in its branched habit and in the nature of its indumentum.

SECTION 4. LASIOSTEMONES

The 12 species of this section are all perennial plants. In all these species the plant is provided with a woody caudex and a deeply penetrating taproot. The most distinctive feature of this remarkable group, however, is found in the ciliate claw and pilose filaments (except S. parrowiana Boiss. and S. Manissadjiani Freyn). The inflorescence is a panicle, but transition from the panicle to a raceme-like inflorescence is found in S. saxatilis Sims and S. Ruprechtii Schischkin, whereas in S. olympica Boiss the inflorescence is raceme-like. In S. longipetala Vent. and S. Manissadjiani Freyn the inflorescence is more or less diffuse, while in others it is not so. The flower in some species is erect, both at and after anthesis, while in other species the flower is nodding at anthesis, becoming erect afterwards. The calyx of the somewhat small flowers is either obconical or campanulate, and is firm in consistency and glabrous.

The species of this section fall into two groups on the stem nature and distribution of the leaves on the stem. In one group the caudical and lower cauline leaves are large and rosetted, while the other cauline leaves are reduced and bract-like. In the other group the cauline leaves are conspicuous and often fasciculate. But these groups have not been given taxonomic rank here as that would result in the separation of related species.

Key to the Oriental species.

1a. Flowers erect at anthesis:

2a. Inflorescence a panicle:

3a. Plant glabrous; pedicels 2.0-4.0 mm. long; calyx 6.0-

8.0 mm.long;limb cuneate;ligules absent;filaments smooth
.....II.S.parrowiana

3b. Plant puberulent,atleast on the lower part;pedicels as long as calyx;calyx 8.5-11.0 mm.long;limb oblong;ligules distinct;filaments pilose
.....10.S.puberula

2b. Inflorescence raceme-like
.....16.S.olympica

1b. Flowers nodding at anthesis:

4a. Filaments smooth;capsule ellipical;ligules absent
.....12. S.Manissadjiani

4b. Filaments pilose;capsule ovoid or ovoid-oblong;ligules present:

5a. Capsule ovoid;limb bipartite almost to the base:

6a. Caudical leaves oblong-lanceolate or oblong-oblanceolate;plants usually puberulent below;panicle diffuse;limb cuneate,bipartite into linear lobes;claw exauriculate 9.S.longipetala

6b. Caudical leaves lanceolate or oblanceolate or linear-lanceolate;plants glabrous;panicle narrow,often raceme-like;limb obovate-cuneate,bipartite into obovate-oblong or obovate-spathulate lobes;claw minutely auriculate:.....

7a. Calyx obconical-clavate,with lanceolate acute teeth;capsule as long as or 1½X as long as anthophore,fully exserted
.....14. S.saxatilis

7b. Calyx campanulate or obconical-clavate,with

ovate obtuse teeth;capsule 3 times as long as anthophore,only I/3 of its length protruding beyond calyx I5.S.Ruprechtii

5b. Capsule oblong-ovoid,limb oblong,bipartite to the middle.Capsule 3-4 times as long as anthophore I3.S.Marschalli

9. S.longipetala Vent.,Pl.Jard.Cels.,83,t.83 (I800);Boiss.,Fl.Or.,i, 636 (I867);Rohrb.,Monogr. Sil.,2II(I868).-Sibth.& Sm.,Fl.Graeca,v,t.4I9 (I825).

Syn. S.longipetala Vent.,Pl.Jard.Cels.,83(I800);non Boiss.,Fl. Or.,Suppl.,I03(I888).
S.longipetala var.purpurascens Boiss.,Fl.Or.,i,636(I867).
S.macropetala Sprengl,Syst.Veg.,ii,4I4(I825).
S.Ehrenbergiana Rohrb.,Monogr.Sil.,I63(I868).
S.expansa Hort ex Rohrb.,Monogr.Sil.,2II(I868).
S.attica Form.in D.B.M.,xvi,80 (I898).
S.macropetala var. attica Form.in V.N.V.Br.,xxxvii,206.
S.longipetala var.vettricosa Siehe,Fl.Or. Exs.,no.38I (I9I0) ms.

Tall perennial,30.0-85.0 cm. in height.Root vertical, tapering,with simple or divided crown.Caudex slender or stout,erect or ascending,sparingly branched,with adventitious roots and marcescent shreds of old petioles.Stem erect,terete,leafy and usually simple below,branched from the middle upwards,branches opposite,long, divaricate,again cymosely and pedicellately branched,thinly and

retrorsely puberulent below,the hairs thinning out in the middle part,upper part glabrous and viscid;middle internodes 3.5-11.2 cm. long.Caudical and lower cauline leaves rosulate,petiolate,3.2-11.0 cm.long,5.0-18.0 mm.wide,oblong-lanceolate,lanceolate sometimes oblanceolate or oblong-spathulate,attenuated into petiole,puberulent, base with hyaline villose margin;other cauline leaves sessile,4.0-8.4 cm.long,7.0-15.0 mm.wide,oblong-lanceolate to linear-lanceolate, sometimes oblanceolate,usually glabrous;all leaves acute or nearly obtuse,3-5-nerved,rarely more or less fasciculate.Inflorescence an open or diffuse panicle;cymules opposite,lax,cymosely branched,3-5- or 1-flowered.Bracts equal,lanceolate to linear-lanceolate;bracteoles often ovate-lanceolate,acuminate,3-5-nerved,with hyaline ciliate margin.Pedicels 1.3-5.2 cm.long,bent down at anthesis,becoming erect in fruit.Flowers hermaphrodite,nodding.Calyx 8.7-11.5 mm.long, 3.8-4.3 mm. diam.,clavate or obconical,truncate-umbilicate,with 10 greenish to purplish more or less thick and sparingly branched & anastomosed nerves,glabrous often scabrous at the nerves;in fruit turbinate;teeth 2.0-2.7 X 2.3-3.0 mm.,ovate or obovate,obtuse,round or emarginate,with wide hyaline ciliate margin.Petal white to purplish 1.1 -1.9 cm.long;claw 3.5-8.0 mm.long,equalling calyx,pilose; auricles absent sometimes minute and obscure;limb 5.0-14.0 X 2.5-3.3 mm.,cuneate,bipartite almost to the base into oblong-linear lobes; ligules two,0.5-1.3 mm.long,oblong,obtuse or denticulate sometimes minute.Filaments exseted,pilose at the base.Styles 3,exserted,hairy at the base.Anthophore 2.5-4.0 mm.long,puberulent.Capsule 7.5-10.0 X 4.0-4.7 mm.,ovoid,3-4 times as long as anthophore,somewhat exserted. Seed 0.9-1.5 mm.long,with flat face and grooved back,granulate,Hp. or Ch.

Type- Trouvee aux environs d'Alep.,Bruguiere & Olivier.

TURKEY- Prov. Elazig:Harput,Schuschnas,8-6-1889,Sint.473.Prov. Erzincan:Kemaliye,Szanduk,6-6-1891,Sint.2492.Prov.Mardin: N.of Mardin,April 1855,SintII.Prov.Gaziantep:Gaziantep,June 1889,Post. Prov.Urfa:Birecik,Haschnadi,3-4-1888,Sint.320.Cilician Taurus: Kel Oluk,1600m.,June 1910,Siehe;Bulghar Maaden,1600m,,14-6-1898, Siehe 117.Prov. Mersin:Boulaukli,29-4-1855,Bal.Prov.Antalya: Cubuk bogazi,22-5-1950,Heilb. & Atilla..Al Eleusin,April 1842,Boiss.. Armenia:Seid Khadji,Aucher 4209. Kizil Hisar,900m.,23-4-1934,Balls.

CYPRUS-Ktima,21-5-1913,Harad.670;Mt.Troodos,Prodromos,18-6-1880, Sint. & Rigo 767;ibid. Lascells;ibid. 17-4-1937,Syngr.1520;ibid. 28-5-1937,Kennedy 353;ibid. 15-6-1939,Lindberg;ibid. 1500-1920m., 20-6-1912,Harad.482;Pass of Troodos,1680m.,3-6-1937,Kennedy354; ibid.24-6-1937,Kennedy355;Aphamis,870m.,4-7-1937,Kennedy356; Chionistra,1740m.,1-8-1939,Kennedy228;above Agia Moni nr. Chrysorogia -tissa,990m., 10-5-1941,Davis 3433.

SYRIA- Aleppo,a 1841,Ky.123;ibid. a1834,Montb.;ibid. Boiss.;ibid. 360m.,3-4-1865,Hausskn;;Damascus,April 1851,Gaill.1948 ;Chamsae, nr.Damascus,27-4-1857, Gaill.1628.

PALESTINE- Nazareth,El Reina,27-3-1942,Davis 4267;Jerash,530m., 4-4-1911,AC. G660;Jerusalem,23-4-1913,Meyers 6606;ibid. a1877, Post 237;Medaba,770m.,24-4-1903,AC. m660;Jeb Kulayb,1400m.,21-4-1933,AC. 11052;Jerusalem,21-4-1951,Grizi 426;ibid.800m.,8-4-1903, AC.660;Samaria little Hermon,Hayne; Jeb Awsha,4-5-1886,Post; Jeb Moutar,100m.,3-4-1911,AC.2660; E.of Jordan,yr.1873,Paine;Tiberias, a 1863-4,Lowne; Jab-ul-Qarn,970m.,27-4-1857,AC.10660; E.of Shawbak, 1000m.,16-4-1937, AC.8660;Methlutha (above Wadi Mojeb) to Dhiban (moab),27-4-1945,Davis 9163.

LEBANON- Sanin,1700m.,17-6-1897,Bornm.188.

IRAQ-Prov.Mosul:Ain Ghazal,360m.,28-4-1933,Guest 4067.Tal Afar,450m., 26-4-1933,Eig,Zohrab & Guest 5113;Ser Aomadia,a1932,Mustafa 3604; Haji Omran,1750m.,3-6-1948,Chap.1194;Matina,1500m.,15-5-1947,Rawi 8716;Gweji dag,N.of Suleimaniya,1200m.,17-4-1942,Rawi 8881;Kursi, Jebel Sinjar,800-1000m.,24-5-1948,Gillett 11016;Tell el Shour, between Tell Afar and Balad Sinjar,June 1934,Field & Lazar 590;sine loco,Aucher 452.

Geogr. Greece,Turkey,Cyprus,Syria,Lebanon,Palestine,Iraq,Egypt and Libya.

Habitat - Fields and rocky places & limestone slopes,alt.100-1920m., Fl.-March-June.

S.longipetala is a very striking species which is easily recognized because of the diffuse inflorescence,cuneate limb with long linear-oblong and divaricating lobes and conspicuously exserted

stamens and styles.The plants are of medium height,with more or less leafy stem which develop a typical paniculate inflorescence;the cymules develop in one plane and they are long and in turn cymosely branched.In other characters, such as shape of calyx and petal,it comes near to S.puberula Boiss.,but differs from it by the shape & size of leaves,spreading panicle and position of the flowers.

10. S.puberula Boiss.,Fl.Or.,i,636 (1867);Rohrb.,Monogr.Sil., 210 (1868).

Syn. S.puberula Boiss.,Fl.Or.,i,636 (1867);non Bertol.(1842-63);non Jord.(1857);non Porta (1879).

S.propinqua Schischkin in Bull de Mus.de Georgie,i,14 (1920-22).

Perennial,30.0-70.0 cm. tall.Root vertical,deepseated, woody,with a simple or divided crown.Caudex 2.0-12.0 cm.long, 2.0-6.0 mm.wide,ascending or erect,often arcuate,branched,often bearing adventitious roots and vegetative buds,covered with the bases of old leaves.Stem erect or ascending or arcuate at the base, terete,leafy,greenish to pale pink,simple below,branched from the middle upwards,puberulent below with short,somewhat retrorse hairs, becoming glabrous and viscid above;nodes more or less swollen; middle internodes 3.5-8.3 cm.long.Leaves monomorphic,1.8-6.6 cm.long, 4.0-12.0 mm.wide,oblong-lanceolate to linear-lanceolate,acute, puberulent or scabrous-puberulent,rarely hirtellous,3-nerved at base; caudical leaves petiolate,usually small,often disappearing in old plants;base with hyaline ciliate margin;cauline leaves sessile

conspicuous,often more or less fasciculate.Inflorescence a panicle; cymules opposite,ascending or erect,3-7- or I-flowered.Bracts equal, lanceolate to linear-lanceolate;bracteoles ovate-lanceolate,acuminate, both 3-nerved,with hyaline ciliate margin.Pedicels of terminal flowers 3.0-7.o mm.long,and those of lateral ones I0.0-22.0mm.long, erect or ascending,seldom puberulent.Flowers hermaphrodite,sometimes pistillate with aborted stamens,erect.Calyx 8.0-II.0 mm.long, 3.0-4.0 mm. diam.,clavate or obconical,truncate-umbilicate,with I0 greenish or pinkish anastomosed nerves,glabrous,sometimes scabrous or more or less puberulent at the nerves,in fruit ovoid;teeth I.3-2.5 X 2.0-2.5 mm.,ovate,obtuse,often obovate emarginate,with wide hyaline ciliate margin.Petal greenish white,I.0-I.7 cm.long; claw 5.0-8.0 mm.long,equalling calyx,ciliate,exauriculate;limb 5.0-9.0 X 2.0-3.5 mm.,cuneate,deeply bipartite into linear or oblong-linear lobes;ligules two,I.0-I.5 mm.long,oblong,obtuse,acute or denticulate.Filaments exserted,pilose at base.Styles 3,pilose at the base,apex thickened.Anthophore 2.0-3.5 mm.,long stout,hairy. Capsule 6.0-II.0 X 3.5-5.0 mm., oblong-ovoid,3-4 times as long as anthophore,½ exserted.Seed brown,I.0-I.5 mm.long,triangular reniform, with flat face and grooved back,granulate,Hp.or Ch.

Type- Turkey-in collibus Armeniae prope Baibout,Bourgean [holo.G; iso.K!,E!]

TURKEY- Armenia,sine loco,Calv.& Zohrab II96;ibid.Feb.I863,Zohrab. Prov. Van,dt.Baskale:Ispiriz dag,3200m.,3I-7-I954,Davis 2376I; dt.Satak: on Kavussahap dag,2700m.,22-7-I954,Davis 2303I;ibid.3000m., 23-7-I954,Davis 23225.Prov.Hakkari: Cilo dag below Cilo yayla, I8-8-I954,Davis 24232.Prov.Bitlis: w. foot of Nemrut dag,I800m., 3-7-I954,Davis 23577.

IRAN - 2 m. W. of Ushnu,I950m., Cow. & Darl. I4I8;ibid. Cow.& Darl. I406.

Geogr. Endemic to countries cited above.

Habitat. On mountains and rocky places;alt.I950-3200m.

Fl.-May-July.

II. S.parrowiana Boiss. & Hausskn.,Fl.Or.,Suppl.,97(I888);Williams in Journ. Linn.Soc.,xxxii,I36 (I896).

Perennial, 30.0 cm.tall.Caudex woody,short,simple or branched.Stem erect,terete,leafy,simple below,branched in the region of inflorescence,glabrous,glaucescent;middle inter-nodes 2.0-4.5 cm. long.Caudical leaves rosulate, petiolate,oblong-lanceolate,acute or acuminate,attenuated into the petiole,base with hyaline scarious margin;cauline leaves 2.6-4.7 cm.long,5.0-I0.0 mm.wide,oblong-lanceolate or lanceolate,sometimes linear-lanceolate,apex hard, more or less pointed;all leaves glabrous,I-nerved,slightly thick. Inflorescence a panicle;cymules opposite,I-3- or 5-flowered,congested. Bracts unequal,linear-subulate,with hyaline scarious margin.Pedicels 2.0-4.0 mm.long,erect or ascending.Flowers hermaphrodite,erect. Calyx 6.0-8.0 mm.long,2.8-3.3 mm.diam.,obconical-cylindrical with umbilicate base,with I0 greenish anastomosed nerves,glabrous,in fruit turbinate;teeth I.3-I.8 X I.3-I.5 mm.,unequal,ovate ,acute tooth alternating with obtuse one,with hyaline ciliate margin.Petal greenish,9.0 mm.long;claw 5.0 mm.long,equalling calyx,greatly expanded above,exauriculate,ciliate;limb 4.0 X I.5 mm.,oblong, bipartite into linear lobes;ligules absent.Filaments included,smooth. Styles 3,exserted,upper portion thickened and hairy.Anthophore 2.0-3.0 mm.long,smooth.Capsule and seed not seen.Ch.

Type- In fissuris rupium calcarearum montibus Lolan et Parrow

Persiae occidentalis prope Kemanschah,5-6000',Hausskn. [holo. G;iso.K!,BM!]

Geogr. Endemic to Iran.

Habitat- Cliff of calcarious rocks.Fl.-August-Sept.

12. S.Manissadjiani Freyn in Bull.Herb.Boiss.,iii,83 (1895); Williams in Journ.Linn.Soc.,xxxii,139 (1896).

Perennial,26.0-42.0 cm.tall.Caudex stout,woody,3.0-6.5 cm.long,5.0-7.5 mm.wide,simple,erect,young portion covered with bases of old leaves.Stem erect or arcuate at base,terete,simple below,becoming branched in the region of inflorescence,glabrous, glaucescent and viscid above.Caudical and lower leaves rosulate, petiolate,3.3-9.8 cm.long,5.0-9.5 mm.wide,lanceolate- or oblanceolate-spathulate,attenuated into petiole,base with hyaline scarious or minutely ciliate margin;other cauline leaves sessile,1.9-4.5 cm. long,3.0-4.5 mm.wide,lanceolate or linear-lanceolate;all leaves acute, 1-nerved,glabrous.Inflorescence a panicle with long,opposite, spreading,1-3-flowered cymules.Bracts and bracteoles equal,small, lanceolate-linear,acute,with narrow hyaline ciliate margin.Pedicels 0.40-2.70 cm.long,bent down at anthesis,becoming erect in fruit. Flowers hermaphrodite,nodding.Calyx 1.0-1.1 cm.long, 3.5-4.0 mm. wide,obconical-cylindrical,umbilicate,subcoriaceous,with 10 anastomosed nerves,glabrous,sometimes scabrous on the nerves,in fruit obovate;teeth 1.8-2.3 X 1.8-2.0 mm., unequal, alternately triangular acute and ovate-obtuse,with hyaline ciliate margin.Petal greenish,1.2 cm.long;claw 6.0 mm.long,slightly exceeding calyx,

elliptical,exauriculate,ciliate;limb 6.0 X 2.0 mm., cuneate,bipartite to 4/5 of its length into obovate-cuneate lobes;ligules absent. Filaments exserted,smooth.Styles 3,exserted,hairy.Anthophore 4.5-5.0 mm.long,scabrous.Capsule ellipsoidal,3 times as long as anthophore,included.Seed not seen. Ch.

Type - Turkey- Pontus Galaticus,Amasia,in pascuis montis Ak dagh d.10 Sept.1892. Manissadjian 942 [holo. G;iso.K!]

Geogr. Endemic to Turkey.
Habitat - On mountains . Fl.- Sept.

13. S.Marschallii C.A.Mey.,Verz.Pfl.Cauc.,214 (1831);Boiss.,Fl.Or., i,635 (1867);Rohrb.,Monogr.Sil.,212 (1868).

Syn. Cucubalus mollissimus M.B.,Fl.Taur-Cauc.,i,324(1808);non Linn,(1763);non Waldest.& Kit.(1812); non Javorka (1914).
Silene lasiopetala Fenzl,Pugill.Pl.Nov.Syr.,24 (1842).
S.Iconia Boiss.& Heldr.,Diagn.Pl.Nov.Or.,Ser.I.viii,55(1849)
S.Guicciardii Boiss.& Heldr.,ibid. SerII,vi,32(1859).
S.graminifolia Heldr.in Boiss.,Diagn.Pl.Nov.Or.,Ser.II,vi, 32 (1859).
S.Marschallii var.Guicciardii Boiss.,Fl.Or.,i,636 (1867).
S.Kerneri Stapf in Denkschr.Akad.Wien,(1886).

Caespitose perennial,32.0-68.0 cm.tall.Caudex 3.0-12.5 cm.long,3.0-8.3 mm.wide,erect or arcuate,many-stemmed,young portion covered with bases of the old leaves.Stem erect,terete,greenish,seldom

purplish from the base upwards,simple below,branched above,especially in the region of inflorescence,retrorsely puberulent below,becoming glabrous and viscid above;middle internodes 5.I-I2.3 cm.long. Caudical and lower cauline leaves rosulate ,petiolate,2.5-7.8 cm. long,I.5-7.0 mm.wide,lanceolate to linear-lanceolate or linear, acute,attenuated into long petiole,base with hyaline ciliate margin; other cauline leaves sessile or subsessile,3.0-7.0 cm.long,I.0-5.0 mm.wide,lanceolate to linear-lanceolate,acute;all leaves puberulent. Inflorescence a panicle;cymules opposite,I-3-flowered.Bracts equal, linear-subulate,base expanded with hyaline ciliate margin;bracteoles ovate-lanceolate,acute or ovate acuminate,like the bracts.Pedicels 4.0-9.5 mm.long,often sparingly puberulent.Flowers hermaphrodite, nodding.Calyx 8.0-9.5 mm.long,3.0-3.5 mm.diam.,obconical-clavate, with I0 greenish or pinkish slightly anastomosed nerves,umbilicate, in fruit obovate;teeth I.5-2.5 X I.8-3.0 mm.,ovate obtuse or round,or obovate, emarginate,with wide hyaline ciliate margin. Petal yellowish, or white,6.0-II.5 mm.long;claw 4.0-6.5 mm.long,equalling calyx,pilose; auricles erose,denticulate,often obscure;limb 2.0-5.5 X I.3-2.0 mm., oblong-cuneate,bipartite to the middle into linear lobes;ligules two,0.7-0.9 mm.long,oblong,obtuse.Filaments exserted,pilose.Styles 3,exserted,hairy.Anthophore 2.5-3.0 mm.long,stout,woolly.Capsule 9.0-II.0 X 5.0-6.5 mm.,ovoid-oblong,3-4 times as long as anthophore, included.Seed dark brown,I.0-I.5 mm.long,triangular or rectangular reniform,with flat tuberculate face and grooved granulate back.Ch.

Type -In altioribus montibus Talusch,locis siccis lapidosis(alt. 600-I000 hexap.) Meyer.

TURKEY- Prov. Elazig:Harput,Schuschnas,8-7-I889,Sint. 668.Prov.

Ankara:Elma dag,1800m.,25-6-1932,Kotte.Prov.Erzincan:Kemaliye, Yakardi dag,1-7-1890,Sint. 2351.Prov.Konya: between Beysehir and Konya,June 1845,Heldr.

IRAN- Mt.Elwend,a1882,Polak;ibid. Aucher 449;Elbrus,prope Derbend, 5-6-1843,Ky.240,529;Mt.Kalak nr.Keredj,17-5-1937,Rechinger 120; Totschal nr.Scheheristanek,2200m.,4-6-1902,Bornm.6369;above Zindjanab,Sahend range,27-6-1929,Gilliat-Smith 2505.

Geogr. Greece,Turkey,Iran and Caucasus.

Habitat- On mountains and rocky places,alt. 1800-2200m.

Fl.-May-July.

S.Marschallii is close to S.saxatilis Sims but is distinct from the latter in its tall stature,puberulent stem and leaves,and well developed panicle.S.Marschallii has got an oblong-ovoid capsule which is 3-4 times as long as anthophore,and included within the calyx.It differs further from S.saxatilis by its oblong-cuneate limb which is divided to the middle,the claw being minutely auriculate,and the leaves linear-lanceolate to narrowly lanceolate.

14. S.saxatilis Sims,Bot.Mag.,xviii,689 (1803);Boiss.,Fl.Or.,i,635 (1867);Rohrb.,Monogr.Sil.,212 (1868).-Loudon,Lad. Fl.Gard.Orn.,i,t.25 (1843);Sims,Bot.Mag.,t.689(1803).

Syn. S.saxatilis Sims,Bot.Mag.,xviii,689(1803);non M.B.(1808); non Schur.(1866).

S.nutans var.glabra DC.,Prodr.,i,377(1824).

S.brachyantha Schott.ex Rohrb.,Monogr.Sil.,213(1868).

Caespitose perennial,15.0-36.0 cm.tall.Caudices several from the crown,woody,1.0-5.7 cm.long,2.5-4.3 mm.wide,ascending or erect,branched,bearing bases of old leaves and vegetative buds.Stem erect,terete,slender,greenish,sometimes purplish from the base

upwards,simple below,branched in the region of inflorescence, glabrous,viscid above;middle internodes 2.4-I2.2 cm.long.Caudical and lower cauline leaves rosulate,petiolate,I.3-5.2 cm.long,2.5-7.0 mm.wide,oblong-oblanceolate to linear-oblanceolate or obovate-spathulate,attenuated into the petiole,base with hyaline ciliate margin,apex acute sometimes obtuse or nearly so,glabrous,often midrib on the dorsal surface scabrous;other cauline leaves sessile, I.9-3.7 cm.long,I.5-3.0 mm.wide,linear,acute,ciliate at the base; all leaves I-nerved.Inflorescence a panicle,sometimes raceme-like; cymules opposite,I-3-flowered.Bracts and bracteoles equal,ovate-acuminate to lanceolate acute,I-nerved,with wide hyaline ciliate margin.Pedicels 5.0-24.0 mm.long,bent down at anthesis,becoming erect in fruit.Flowers hermaphrodite,nodding.Calyx 7.0-I0.0 mm.long, 2.5-3.0 mm.diam.,obconical-clavat,umbilicate,with I0 purplish, more or less anastomosed nerves,glabrous,in fruit obovate-turbinate, more or less constricted below the capsule;teeth 2.0-3.0 X I.0-I.5 mm.,lanceolate,acute,with hyaline ciliate margin.Petal greenish yellow or white with purplish tinge,I.I5-I.5 cm.long;claw 6.0-8.5 mm.long,exserted,pilose;auricles obtuse,acute or obscure;limb 5.5-6.5 X 2.0-3.0 mm., obovate-cuneate,bipartite almost to the base into oblong-spathulate lobes;ligules two,I.3-I.8 mm.long,linear, acute.Filaments exserted,pilose.Styles 3,exserted,hairy.Anthophore 4.0-6.0 mm.long,stout,woolly.Capsule 6.0-8.0 X 4.0-5.0 mm.,ovoid, I-I½X as long as anthophore,fully exserted.Seed brown,0.8-I.3 mm. long,with flat tuberculate face and grooved,granulate back.Ch.

Type- Based on cultivated material introduced from Siberia by Loddiges.

TURKEY-Prov.Rize,dt.Ikizdere:Vercinin Tepe,3300m.,29-8-1952,Davis 21139;Cimil,2000m.,July 1866,Parquet;ibid.2000m.,July 1866,Bal. 1416.Prov.Giresun:Balaban daglari(Kiline Tepe),above Tamdere,2000m., 6-8-1952,Davis 20483;ibid. 2700m.,7-8-1952,Davis 20603.Prov.Amasya: Ak dag,23-8-1889,Bornm.985.Prov.Erzerum:Erzerum,Montb.;ibid. Aucher 426.Prov.Gumusane:Godena,14-6-1894,Sint.5869;nr.Gumusane,8-6-1862, Bourg. 44. Armenia, between Trapezuntem and Baiburt,15-1800m.,Aug. 1853,Huet. Prov.Gumusane/Trabzon:Zigana Pass,1680m.,12-7-1934, Balls 1666 and 1665.Kurdistan,sine loco,yr.1840,Strang.

IRAN-Elamut,Aucher 4226.

Geogr.Turkey,Iran and Caucasus.

Habitat- Crevices of vertical rocks and in rocky places;alt.1500-3300m.;Fl.-June-Aug.

S.saxatilis shows considerable resemblance to S.nutans Linn. in its indumentum,general habit,paniculate inflorescence and leaf shape.This resemblance is sufficient to suggest that the section Lasiostemones is very close to the section Viridiflorae.

S.saxatilis though simulates S.nutans,is a distinct species,differing from the latter in its pilose or villose filaments and claw,and the relative length of capsule and anthophore. S.saxatilis is unique in the whole section in having a naked capsule.

15. S.Ruprechtii Schischkin in Gross.,Sosnow. and Schischkin, Fl.Tifl.,204,t.83 (1925).

Perennial,15.0-40.0 cm.tall.Caudices several from the crown,slender,ascending,branched,covered with the bases of old leaves.Stem erect,often arcuate at base,terete,often dark purplish above,simple below,sparingly branched in the region of inflorescence, glabrous;middle internodes 3.5-8.4 cm.long.Caudical and lower cauline leaves rosulate,petiolate,2.6-7.0 cm.long,3.0-11.6mm.

wide,oblanceolate,attenuated into petiole,base with hyaline ciliate margin,obtuse to acute;other cauline leaves sessile,reduced,remote, 2.0-2.7 cm.long,I.5-2.3 mm.wide,linear-lanceolate to linear,acute, with membraneous ciliate margin at base;all leaves I-nerved,glabrous, serrate-ciliate.Inflorescence a panicle;cymules opposite,short, I-3-flowered.Bracts and bracteoles subequal,ovate acute or acuminate, I-nerved,with hyaline ciliate margin.Pedicels 9.0-I8.0 mm.long, erect or ascending.Flowers hermaphrodite,erect?.Calyx 7.0-9.0 mm. long,3.3-4.0 mm.diam.,obconical-clavate or campanulate,slightly umbilicate,purplish,with I0 more or less anastomosed nerves,glabrous, in fruit obovate or turbinate;teeth 2,8-3.3 X 2.3-2.8 mm.,ovate, obtuse,with wide hyaline ciliate margin.Petal greenish white or livid,I.I-I.55 cm.long;claw 5.0-7.5 mm.long,exserted,villose at the margin,exauriculate;limb 6.0-8.0 X 2.0-2.5 mm.,obovate,bipartite almost to the base into obovate-spathulate lobes;ligules two,I.0-I.3 mm.long,linear.Filaments exserted,pilose.Styles 3,exserted,hairy. Anthophore 2.5-3.0 mm.long,stout,pilose.Capsule 5.5-7.0 X 3.5-4.0 mm., ovoid,3 times as long as anthophore,exceeding calyx by I/3. Seed brown,I.0-I.3 mm.long,with flat striate face anf groovвd, tuberculate back. Hs.or Ch.

TURKEY- Prov.Rize,dt.Ikizdere:Vercinin Tepe,3300m.,29-8-I952,Davis 2II39.Prov.Hakkari:Cilo dag,I0 km. E.of Cilo Tepe,3090m.,9-8-I954, Davis 24I43;ibid.3000m.,8-8-I954,Davis 24037.

Geogr. N.E.Turkey and Caucasus.

Habitat- On vertical rocks and damp ledges on cliff;alt.3000m..

Fl.-Aug.

S.Ruprechtii is very closely related to S.saxatilis

Although the two can not with certainity be distinguished on general habit,absence of indumentum and nature & shape of leaves, yet the inflorescence,shape of the calyx and its teeth,and the relatives length of capsule and calyx & of capsule and anthophore differ;the inflorescence in S.Ruprechtii is usually raceme-like, the flowers often crowded near the nodes,the calyx campanulate or obconical-clavate with ovate obtuse teeth,the capsule 3 times as long as anthophore which exceeds calyx only by I/3 of its length.

I6. S.olympica Boiss.,Diagn.Pl.Nov.Or.,Ser.I.i,24 (I842).

Caespitose perennial,5.0- 35.0 cm.tall.Root vertical, woody,with a simple or divided crown.Caudex 3.0-9.7 cm.long,2.0-5.5 mm.wide,ascending or erect,sometimes decumbent,branched,covered with bases of old leaves.Stem erect,sometimes arcuate at the base, terete,simple,subscapiform,glabrous or puberulent below and somewhat viscid above;middle internodes 3.0-7.5 cm.long.Caudical and lower cauline leaves rosulate,petiolate,I.4-5.3(7.0) cm.long,I.5-4.0mm. wide,spathulate-lanceolate to linear-lanceolate,attenuated into the petiole,base with hyaline margin;other cauline leaves sessile, reduced,remote,bract-like,7.0-22.0mm.long,I.0-2.3 mm.wide,linear, base with hyaline margin;all leaves acute,I-nerved,serrate-ciliate, glabrous with glaucous bloom,sometimes puberulent.Inflorescence raceme-like;cymules opposite,short,usually I-flowered.Bracts and bracteoles equal,ovate-lanceolate,acute,I-3-nerved with wide hyaline ciliate or scarious margin.Pedicels 3.0-7.0 mm.long.Flowers erect, hermaphrodite.Calyx 5.0-9.3 mm.long,3.0-3.5 mm. diam.,clavate,with I0 purplish more or less anastomosed nerves,slightly umbilicate;

teeth 1.3-2.0 X 1.3-2.3 mm.,ovate,obtuse with wide hyaline ciliate margin.Petal white,4.0-10.5 mm.long;claw 3.0-6.5 mm.long,included, ciliate;auricles minute or obscure;limb 1.0-4.0 X 1.0-2.5 mm., obovate-cuneate or oblong-cuneate,bipartite into oblong-obovate lobes;ligules two,small,sometimes absent.Filaments exserted,hairy. Styles 3,exserted,hairy.Anthophore 1.5-4.0mm.long,hairy.Capsule 4.0-7.0 X 3.0-4.0 mm., ovoid-oblong,1½-4 times as long as anthophore,included or exceeding calyx by 1/3.Seed brown,0.8-1.3 mm.long,with flat face and convex back,granulate.Hs.

Key to the subspecies.

Plants glabrous,leaves lanceolate to linear-lanceolate; inflorescence spicate;calyx 5.0-7.0 mm.long;petal ligulate;capsule 3-4 times as long as anthophore,exserted by 1/3 .....i.subsp. olympica

Plants tomentellose to puberulent,especially the lower part;leaves spathulate-lanceolate;calyx 8.5-11.0 mm.long; petal eligulate;capsule 1½-2 times as long as anthophore, included .....ii.subsp. lasiantha

i. Subsp. olympica . Boiss.,Fl.Or.,i,609(1867);Rohrb.,Monogr.Sil., 198(1868).

Syn. S.olympica Boiss.,Diagn.Pl.Nov.Or.,Ser.I.i,24(1842);non Ky.,Pl.Exs.;non Pancic,Pl.Exs.

S.tenella Schischkin in Komarov,Fl.U.R.S.S.,vi,639(1936); non C.A.Mey (1831);non Koch;non Huet .

S.bracteata Boiss.in Tchih.As.Min.no.126 .

S.calyculata C.Koch in Linnaea,xix,56 (1847).

S.sahendica Boiss. & Buhse,Aufz.,38 (1860).

S.olympica var. stenophylla Boiss.,Fl.Or.,i,610(1867); non Trautv.(1876).

S.olympica var. calyculata(Koch) Williams in Journ.Linn.Soc. xxxii,154(1896).

S.olympica var.glabrata Williams in Journ.Linn.Soc.,xxxii., 154(1896).

Stem simple,glabrous.Caudex short.Caudical and lower cauline leaves linear-lanceolate or oblanceolate-linear,acute, attenuated into the petiole,base with scarious or minutely ciliate margin;other cauline leaves sessile,reduced,linear-lanceolate;all leaves glabrous.Inflorescence spicate;axis usually short.Flowers subsessile.Calyx 5.0-7.0 mm.long,obconical-clavate,glabrous.Petal 4.0-6.8 mm.long;limb obovate- or oblong-cuneate,ligulate.Filaments pilose.Anthophore 1.5-2.3 mm.long,hairy.Capsule 4.0-6.0 mm.long, 3-4 times as long as anthophore,½ of it protruding beyond calyx.

Type- Turkey-in Olympi Bithyni praeruptis herbidis,Jul.1842, Aucher 485 [holo.G;iso.K!]

TURKEY-Prov.Amasya:Sana dag,1600m.,15-5-1890,Bornm.2858;Ak dag,16-1800m.,19-5-1889,Bornm.76.Prov. Kastamonu/ Cankiri:Ilgaz dag (Ilkas) above Karakol,20-2160m.,23-6-1929,Bornm.13343. Armenia, Kara dag June 1834,Montb.2591.Cilician Taurus,yr.1896,Siehe 539;Bulghar Maaden,July 1855,Bal.799;Bulghar magara,a.1896,Siehe 536; Bolkar daglari,Gisyl deppe,July 1853,Ky.129.Pro.Burs: Ulu dag,14-8-1850, Clement;ibid.,18-5-1850,Clement ;ibid.,Montb.;ibid.,July1873,Pichler; ibid.,July 1874,Pichler;ibid.,a.1867,Ball ;ibid.,a.1842,Boiss.

ii. Subsp. lasiantha (Koch) Chowdhuri,comb.et stat.nov.

Syn. S.lasiantha Koch in Linnaea,xv,7I2(I84I).

S.olympica var.pubescens Boiss.,Fl.Or.,i,6I0(I867).

S.olympica var.stenophylla Trautv.in Act.Hort.Petrop., iv,354(I876);non Boiss.(I867)

S.Marschallii var.lasiantha Rupr.,Fl.Cauc.,I95(I869).

S.asperifolia Freyn in Bull.Herb.Boiss.,iii,97(I895).

S.longipetala var.asperifolia Williams in Journ.Linn.Soc., xxxii,I65(I896).

S.sahendica var.pubescens Bornm.,Pl.It.Pers.,no6380(I902) ms.

Stem simple,puberulent or more or less tomentellous. Caudex slender,long.Caudical and lower cauline leaves spathulate-lanceolate,attenuated into petiole,base ciliate;other cauline leaves sessile,much reduced,linear.Inflorescence raceme-like.Flowers more or less pedicellate.Calyx 8.0-9.3 mm.long,obconical-cylindrical,glabrous, sometimes scabrous.Petal 9.0-I0.5 mm.long;limb obovate-cuneate, bipartite,eligulate.Anthophore 3.0-4.0 mm.long,hairy.Capsule 6.0-7.0 mm.long,I½-2 times as long as anthophore,included.

Type- Turkey-in Armenia Occidentali,Koch [B?]

TURKEY-Armenia,sine loco,Zohrab;ibid. Calv.& Zohrab.Prov.Erzurum: Erzurum,Zohrab I69;ibid.,Zohrab I53;Tech dag,above Erzurum,6-7000m., July I853,Huet .Prov.Kayseri:Erciyas dag,20-7-I856,Bal.675.Prov. Van, dt.Satak:Kavussahap dag,3300m.,23-7-I954,Davis 23207.

IRAN-Totschal,37-3800m.,8-7-I902,Bornm.6380;ibid.,3I50m.,July I935, Lindsay 538.

Geogr.(of sp.) Turkey,Iran and Caucasus.

Habitat-(of sp.) On mountains and rocky places;alt.I6-3300m.

Fl.-May-July.

S.olympica resembles S.saxatilis Sims and S.Ruprechtii Schischkin in size and general habit,and in having a ciliate claw and pilose filaments,but S.olympica is easily distinguished by its spicate inflorescence;form of calyx teeth,and by the relative length of capsule and anthophore.From S.Ruprechtii it is set off by the shape of calyx,size and shape of petal and general habit of the plant.

So far as the general habit and inflorescence is concerned,it bears some resemblance to S.capitellata Boiss.,but differs from the latter in its ciliate claw,bipartite limb,and filaments pilose at the base.

Although the ranges of the subspecies overlap,subspecies lasiantha tends to be more eastern in its distribution.

SECTION 5 SCLEROCALYCINAE

The 20 species of this section are characterized by a branched and suffruticose caudex,usually glabrous and glaucous stems and leaves,leaves either lanceolate or linear-lanceolate or oblanceolate ,(sometimes ovate),paniculate inflorescence,cylindrical-clavate or clavate calyx which is glabrous and provided with an annular ring at the base,and has alternating obtuse and acute teeth;petals either obcordate- or obovate-cuneate (sometimes cuneate),bipartite,usually ligulate;capsule oblong or ovoid-oblong and stipitate.

The species fall into two distinct subsections on the basis of the relative size of the caudical and cauline leaves.The subsection Longiflorae is characterized by large,rosulate caudical and lower cauline leaves,the other cauline leaves being usually much reduced.Whereas the subsection Chlorifoliae is set off by the large and conspicuous cauline leaves;the caudical and lower cauline leaves,though rosulate and petiolate,are generally not conspicuous and sometimes disappear from mature plants

Key to the subsections and Oriental species.

Ia. Caudical and lower cauline leaves large and rosulate,lanceolate to linear-lanceolate or linear;other cauline leaves usually reduced and bract-like Subsection5A.Longiflorae

2a. Capsule ovoid-oblong,as long as or slightly longer than anthophore;limb obcordate- or obovate-cuneate:

3a. Capsule included;bracts ovate-caudate I7.S.longiflora

3b. Capsule I/3 exserted;bracts linear-lanceolate or linear 18.S.caramanica

2b. Capsule oblong,2 times as long as anthophore;limb usually cuneate,rarely obcordate-cuneate:

4a. Flowers pink;calyx obconical-cylindrical 19.S.peduncularis

4b. Flowers not pink;calyx cylindrical-clavate:

5a. Bracts ovate-caudate,3-nerved;stem scapiform,densely hairy below;capsule protruding I/3 of its length beyond calyx 20.S.lycica

5b. Bracts linear-lanceolate or ovate-lanceolate, I-nerved;stem more or less leafy,usually glabrous; capsule included or ½ exserted:

6a. Claw equalling calyx;limb cuneate,greenish-yellow;capsule ½ exserted 21.S.armena

6b. Claw exserted;limb obcordate-cuneate,white; capsule included,seldom slightly exserted 22.S.serrulata

Ib. Caudical and lower cauline leaves rosulate,small,often disappearing from the mature plants;other cauline leaves conspicuous,gradually reduced above: ... Subsect.5B.Chlorifoliae

7a. Cauline leaves ovate with cordate or subcordate base:

8a. Calyx I.5-2.5 X 0.3-0.43 cm., cylindrical;petal eligulate; capsule twice as long as anthophore 23.S.laxa

8b. Calyx 2.5-4.2 X 0.63-0.7 cm.,cylindrical-clavate;petal ligulate;capsule I-I½ times as long as anthophore 24.S.chlorifolia

7b. Cauline leaves not ovate,usually lanceolate or oblanceolate or linear-lanceolate,seldom ovate-lanceolate:

9a. Calyx teeth ovate and obtuse alternating with triangular and acute teeth;anthophore smooth:

10a. Flowers erect at anthesis:

11a. Flowers hermaphrodite:

12a. Cauline leaves oblong-lanceolate,ovate-lanceolate,sometimes oblanceolate(then capsule longer than anthophore):

13a. Calyx 2.0-2.2 X 0.35-0.4 cm.;petal eligulate with cuneate limb;capsule I/3 exserted 25.S.caesarea

13b. Calyx 2.3-4.0 X 0.6-0.7 cm.;petal ligulate with obcordate- or obovate-cuneate limb; capsule included 26.S.swertiifolia

12b. Cauline leaves linear,linear-lanceolate, lanceolate or oblanceolate:

14a. Capsule I½ times shorter than anthophore; cauline leaves oblanceolate;limb obcordate-cuneate,bipartite I/3 of its length 27.S.sclerophylla

14b. Capsule as long as or slightly longer than anthophore;cauline leaves linear or linear-lanceolate;limb obcordate- or obovate-cuneate,bipartite ½ its length:

15a. Cauline leaves long,linear or lanceolate-linear;anthophore

I.4-I.75 cm.long;limb obcordate-cuneate

....32.S.Schimperiana

I5b. Cauline leave short,lanceolate or linear-lanceolate; anthophore 0.9-I.2 cm.long;limb obovate-cuneate

..... 29.S.makmeliana

IIb. Flowers unisexual(only female known)

.....28.S.sclerophylloides

I0b. Flowers nodding at anthesis

.....30.S.libanotica

9b. Calyx teeth long and acuminate alternating with short and acute teeth;anthophore hairy

.....3I.S.Haradjianii

SUBSECTION 5A LONGIFLORAE

I7. S.longiflora Ehrh.,Beitr.,vii,I44 (I792).

Perennial, 23.0 -87.0 cm.tal. Root woody,slender,with a multicipital crown.Caudex 3.0 -I4.0 cm.long,3.0 -7.5 mm.wide,2-5-forked,ascending or erect,sometimes more or less prostrate,branched, bearing vegetative buds and leaf scars on the older part and bases old leaves on the younger portion.Stems several from the crown,erect, terete,usually simple below,branched above especially in the region of inflorescence,seldom branched throughout;lower branches as long as or longer than the main axis or shoot,glabrous throughout,more or less viscid above;middle internodes 5.0-I3.3 cm.long.Caudical and

lower cauline leaves rosulate,petiolate,3.5-14.5 cm.long,2.0-12.0 mm.wide,oblong- to linear-lanceolate,seldom oblanceolate,attenuated into short petiole,base with hyaline margin, apex obtuse or acute; other cauline leaves sessile or subsessile,1.5-11.3 cm.long, 2.0-10.0 mm.wide,lanceolate,linear-lanceolate or linear,acute;all leaves 1-nerved,serrate-ciliate at the margin,glabrous.Inflorescence a panicle;main axis long;cymules opposite,seldom alternate,lower ones long,3-7-flowered,upper ones short,1-3-flowered.Bracts equal, ovate caudate;bracteoles linear-lanceolate or linear,acuminate, both with wide hyaline ciliate margin.Pedicels 0.5-4.7 (10.0) cm. long,erect or ascending,slender,sometimes stout.Flowers hermaphrodite, rarely pistillate with aborted stamens,erect.Calyx (1.4) 1.6 -4.5 cm.long, (3.0) 3.5-6.3 mm.diam., cylindrical-clavate,glabrous,with 10 pikish anastomosed nerves,in fruit clavate,base pseudo-umbilicate with an annular ring;teeth 1.8-7.0 X 1.5-5.0 mm.,unequal, triangular or lanceolate,acute or acuminate and ovate obtuse or obovate emarginate alternating,with wide membraneous ciliate margin.Petal white,1.4-3.0 (3.5) cm.long;claw 0.9-1.8 (2.3) cm.long, exserted,smooth,exauriculate;limb 0.5-1.2 X 0.35-0.7 cm.,obcordate- or obovate-cuneate,bipartite to the middle into oblong-obovate or obovate lobes;ligules two, 1.5-3.0 (5.0) mm.long,oblong or linear, sometimes triangular,obtuse,acute or fimbriate.Stamens exserted, filaments smooth.Styles 3,exserted,hairy above.Anthophore 1.0-1.8 (2.1) cm.long,smooth.Capsule 1.0-1.55 X 0.55-0.7 cm.,ovoid-oblong, usually as long as,sometimes shorter than anthophore,included.Seed dark brown,2.0-3.3 mm.long,with flat striate face and grooved tuberculate back.Hs. or Ch.

Key to the subspecies.

Ia. Stem simple below, branched above; cauline leaves reduced; pedicels I.0-3.5 cm. long, slender; limb obcordate- or obovate-cuneate, bipartite to the middle:

2a. Stem usually 40.0-87.0 cm. tall; caudical leaves lanceolate or oblong-lanceolate; cauline leaves gradually reduced above; inflorescence lax; lower cymules long, 3-7-flowered; capsule as long as anthophore ..... i.subsp. longiflora

2b. Stem of medium stature, 23.0-48.0 cm. tall; caudical leaves linear or linear-lanceolate; cauline leaves much reduced and remote; inflorescence very narrow; cymules short, I-or 2-flowered; capsule shorter than anthophore .....ii.subsp. staticefolia

Ib. Stem branched throughout; branches more or less divaricate; cauline leaves, though somewhat reduced, still conspicuous; pedicels 4.0-I0.0 cm. long, stout; limb obovate-cuneate, bipartite to I/3 of its length .....iii.subsp. ramosa

i. Subsp. longiflora . Boiss., Fl.Or., i, 639 (I867); Rohrb., Monogr. Sil., I78 (I868).-Reichb., Ic.Fl.Germ.Helv., vi, t.294, fig.5I07 (I844); Sibth.& Sm., Fl.Graeca, v, t.435 (I825); Javorka & Csapody, Ic.Fl.Hung., Page II, t.II6I & Page I46, t.II6I (I930).

Syn. S.longiflora Ehrh., Beitr., vii, I44 (I792); non Bory (I838)

S.bupleuroides Linn.,Sp.Pl.,I.421 (1753).

S.viscariaefolia Boiss.,Diagn.Pl.Nov.Or.,Ser.I,i,30(1842).

S.staticefolia C.Koch Pl.Exs.Arm.;non Sibth.& Sm.(1806); non Fenzl .

S.megalocalyx Freyn in Bull.Herb.Boiss.,iii,82 (1895).

Stem 40.0-87.0 cm.tall,simple below,branched in the region of inflorescence,sometimes sparingly branched throughout; branched ascending,shorter than the main axis.Caudical and lower cauline leaves 7.5-14.5 cm.long,6.3-12.0 mm.wide,oblong-lanceolate; other cauline leaves gradually reduced.Inflorescence racemosely paniculate;lower cymules opposite,long,3-7-flowered,upper ones 1-3-flowered.Pedicels 0.5-3.0 cm.long,slender.Petal obcordate- or obovate-cuneate,bipartite to the middle.Capsule as long as anthophore.

TURKEY- Prov.Rize:Cimil,Aug.1866,Bal.1419;ibid. 2000m.,Aug.1866, Parquet . Prov. Erzerum:Erzerum,18-1860m.,July 1853,Huet .Prov. Erzincan:Kemaliye,Maghana dag,5-8-1890,Sint.2895. Armenia, sine loco Calv.& Zohrab;ibid.Montb.2470;ibid.Aucher 456.Armenian Taurus, at Pirinbaghere,Sipikor,3-6-1890,Sint.3107. Prov.Van,dt.Baskale: Ispiriz dag,2800m.,31-8-1954,Davis 23681;ibid. 31-8-1954,Davis 23748.Prov.Konya:between Ermenek & Karaman,July 1845,Heldr.

IRAN- Elbrus,Totschal,nr.Scheherrstanak,2200m.,7-6-1902,Bornm.6366.

ii. Subsp. staticefolia (Sibth.& Sm.) Hayek,Prodr.Fl.pen.Balc.,i, 281(1927)-Sibth.& Sm.,Fl.Graeca,v,t.434(1825).

Syn. S.staticefolia Sibth.& Sm.,Fl.Graeca Prodr.,i,301(1806); non Koch;non Pourr.;non Fenzl.

S.juncea Roth,Catal.,i,54 (1797).

S.longiflora var.juncea Otth in DC.,Prodr.,i,328(1824).

S.pallida Schur,Sert.Fl.Transs.,12 (1853).

S.longiflora var.pallida Schur,ibid.

S.longiflora var.linearifolia Heuff.,Enum.Banat.,36(1858).

S.makmeliana Boiss. & Buhse,Aufz.,37 (1860).

S.longiflora var.alpina Boiss.,Fl.Or.,i,179(1867).

S.longifolia var.pallida Schur,Enum.Pl.Transs.,102(1866).

S.viscariaefolia Bourg ex Rohrb.,Monogr.Sil.,179(1868).

S.longiflora var.staticefolia Boiss.,Fl.Or.,Suppl.,103(1888)

S.tenuicaulis Freyn & Bornm. in Pl.Exs.Anatoliae Or.no. 1314 (1889)ms.

S.othryana Form.in D.B.M.,xv,198(1897).

Densely caespitose.Stem 23.0-48.0 cm.long,simple.Caudical leaves 3.5-7.3 cm.long,2.0-7.5 mm.wide,linear-lanceolate or linear; cauline leaves reduced and remote,more or less adpressed to the stem.Flowers 3-5 or 7 in a raceme-like inflorescence;lateral cymules opposite or alternate,short,1-flowered.Calyx pale pink with less anastomosed nerves.Pedicels short.Petal obcordate- or obovate-cuneate,bipartite to the middle.Capsule somewhat shorter than anthophore.

TURKEY-Prov.Mugla:Sandras dag,22-7-1947,Davis;ibid.23-7-1947,Davis 13535;ibid.nr.Kokluce,23-7-1947,Davis 13605. Prov.Antalya:dt.Gebiz (Pisidia),Bozburun dag,between Tesli yayla and Korlu Dere,1600m., 27-7-1949,Davis 15725.Prov.Konya: S.of Karanji Dere,between Geyik dag and Bozkir,1800m.,1-9-1947,Davis 14622.Prov.Konya/ Antalya: Kara dag (N.of Geyik dag),2000m.,1-9-1947,Davis .Prov. Seyhan/Hatay:Nur dag at Duldul,1500-2100m.,July 1908,Harad.2325. Cappadocica: Ak dag,17-1900m.,1-8-1889,Bornm.1314.Prov.Canakkali/ Balikesir:Koz dag,mt.Szu Szus dag,27-7-1883,Sint.649.Lyconia,Oct. 1841,Frobes 183.

iii. Subsp. ramosa Chowdhuri,subsp.nov.

Syn. S.bupleuroides Sint.Pl.It.Pers.,no.905(I900)ms.

Affinis A.longiflorae subsp.longiflorae sed caulibus laxe et divaricatim ramosis,foliis caulinis numerosis,pedicellis 4.0-I0.0 cm.longis crassiusculis,lamina petalorum obovata minus bipartita recedit.

Caules erecti vel adscendentes,superne laxe et divaricatim ramosi,foliosi.Folia caudicalia 5.0-I2.2 cm.longa,5.0-9.0 mm.lata, oblanceolata vel lanceolato-spathulata,in petiolum attenuata;folia caulina numerosa,conspicua,3.7-8.5 cm.longa,6.0-9.0 mm.lata, lanceolata vel lineari-lanceolata,sessilia,omnia acuta vel obtusa. Inflorescentia laxa,paniculata,multiflora.Pedicelli 4.0-I0.0 cm. longi, plus minus crassiusculi.Dentes calycis lanceolatae acuminatae et obtusae alternatim.Lamina petalorum obovato-cuneata minus bipartita.Capsula anthophoro aequilonga,calyce inclusa.

Type- Iran-Aschababad,Suluklu,I3-7-I900,Sint.905 [holo.K;iso.BM.]

Geogr.(of sp.) Austria,Hungary,Bulgaria,Czechoslovakia,Greece, Turkey,Caucasus,Iran and Palestine.

Habitat-Rocky places;alt. I5-2800m. Fl.-July-Aug.

S.bupleuroides was described by Linnaeus in his 'Species Plantarum',ed.I,i,42I (I753) with the following description " Caule folioso herbaceo,foliis lanceolatis acutis glabris,calycibus erectis.Hab.in Persia "This description is insufficient to diagnose a species of Silene.Later on Boissier and Rohrbach both expanded this brief description.In both cases,the description was

based on the materials collected from Turkish Armenia;they probably had not seen the type specimen nor examined any specimen from the locus classicus.Rohrbach,while discussing the difference between S.bupleuroides and S.longiflora,stated that calyx teeth short and all of them are acute.

S.longiflora was proposed by Ehrhart in his Beitr., vii,144(1792) and the specimen on which he based his description was probably from Hungary.S.longiflora as known at present,spreads over an wide area-extending from Austria to Iran.

The characters used by these authors who maintain both S.bupleuroides and S.longiflora as distinct species have been investigated,and it has become clear that they have no value for differentiating them at specific or even varietal level.The calyx teeth which are described by Boissier and Rohrbach as acute,vary greatly.I have examined the holotype at the British Museum,London, and found that out of the 13 or 14 flowers on the sheet,11 of them have acute and obtuse teeth alternating,and differ in size and in angles they subtend at their apices.The nature and the angle of the calyx teeth depend on the degree to which the white membraneous margin is developed,which in turn appears to be affected by environmental conditions.The length of calyx,which varies greatly in both S.bupleuroides and S.longiflora,has a range of variation and that overlaps.Apart from these characters the general habit,nature of stem,size and shape of leaves,nature of inflorescence,and shape of bracts and bracteoles are shared by both taxa.Therefore,considering this and remembering the variation found in other polymorphic species,there can be little doubt that S.bupleuroides and S.longiflora represent variation within

one species.

S.tenuicaulis Freyn & Bornm. is here reduced to a synonym, since it possesses no characters that do not well come within the limit of S.longiflora Ehrh.

There is very little basis for maintaining S.megalocalyx Freyn and S.longiflora as separate entities. In describing S. megalocalyx Freyn stated that S.megalocalyx differed from both S.swertiifolia and S.caramanica - from the former by its leaves and large flower and from the latter by its calyx teeth (which are said to be acute) and size & form of seed. Williams recognized this species, and described the nerves as 'evenius'. I have examined an isotype with the same date and no. of collection, and found that the calyx teeth are alternately obtuse and acute and the nerves are more or less anastomosed [fig. 3]. Considering the variability of the calyx teeth and length & size of calyx, I am unable to accept S.megalocalyx as distinct species.

I have recognized 3 subspecies, the distribution of which has been shown in the map [Map I]. It will be seen that the subspecies longiflora spreads from Turkey to Iran while the subsp. staticefolia is restricted to the Mediterranean region of Turkey. The subsp. ramosa is found only in the N.W. of Iran.

Fig.3

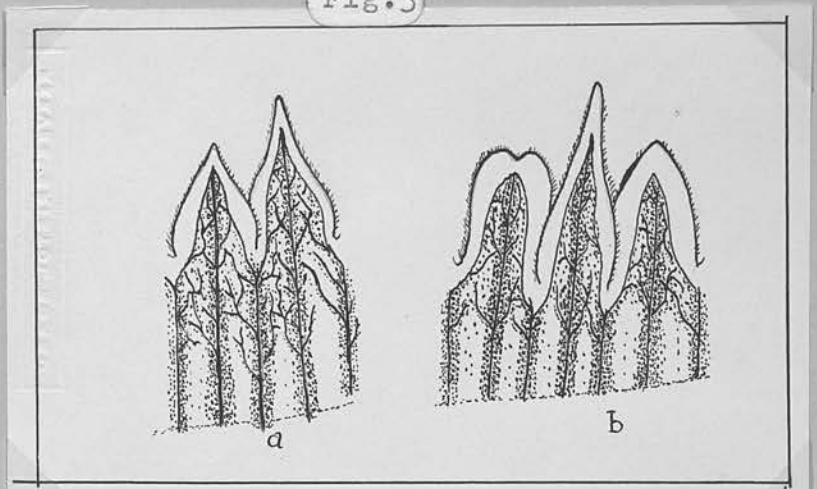
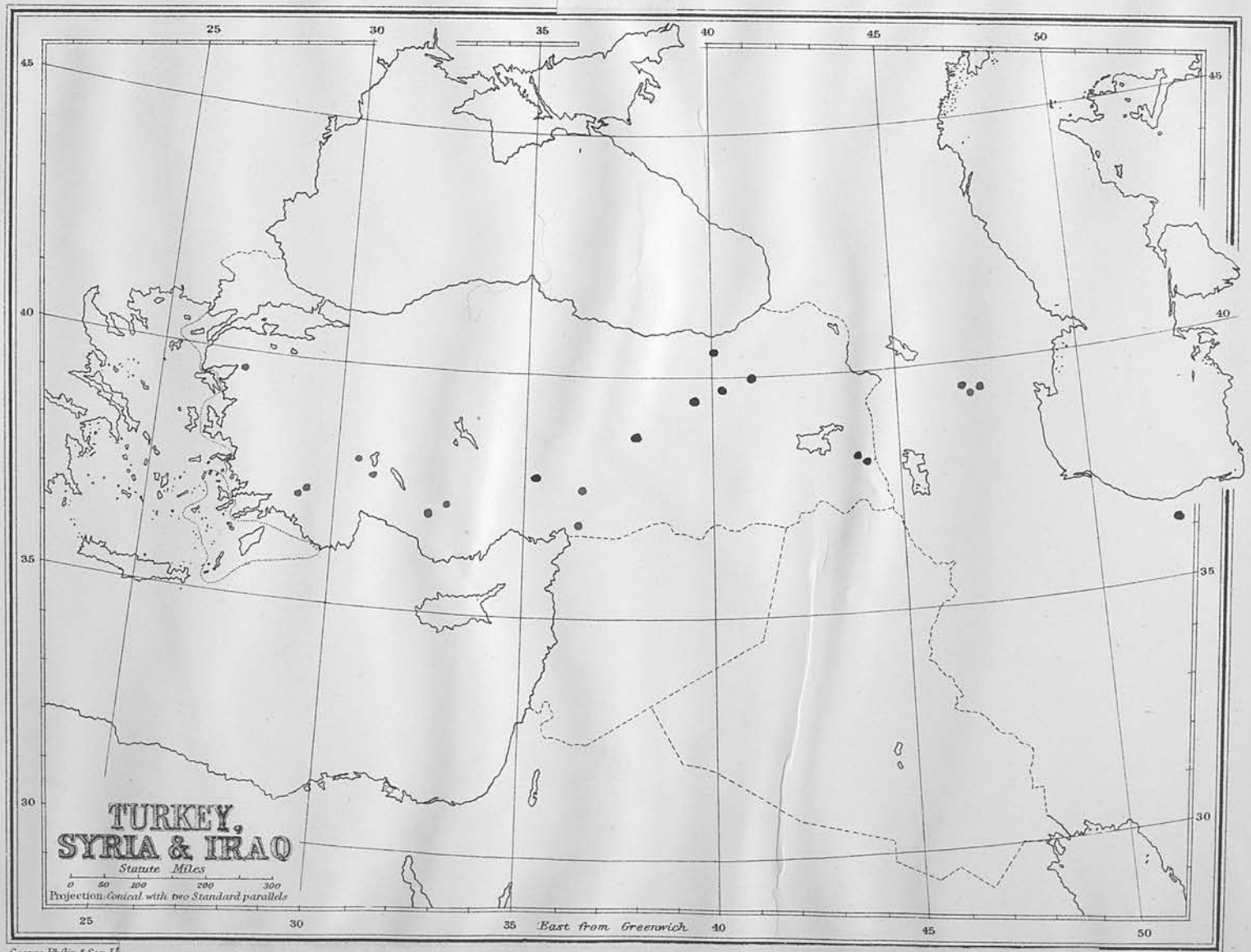


Fig.3.Calyx teeth of S.tenuicaulis Freyn & Bornm. and S.megalocalyx Freyn showing obtuse teeth alternating with acute teeth and anastomosed nerves.

MAP 1



Map 1.Distribution of Silene longiflora.

Subsp.longiflora • Subsp.staticefolia • Subsp.ramosa •

I8. S.caramanica Boiss.et Heldr.,Diagn.Pl.Nov.Or.,Ser.I,viii,90 (I849);Boiss.,Fl.Or.,i,642(I867);Rohrb.,Monogr. Sil.,I76 (I868).

Syn. S.bupleuroides Heldr.,Pl.Isauria,yr.I845,ms.;non Linn. (I753);non Ledeb.

S.bupleuroides var.solenocalyx Boiss.& Huet,Diagn.Pl.Nov. Or.,Ser.II,v,57(I856).

S.caramanica var.solenocalyx Boiss.,Fl.Or.,i,642(I867).

Perennial,23.5-47.0 cm.tall.Caudex 3.0-6.5 mm.wide,elongated upto 7.0 cm.,becoming branched and suffruticose,erect or ascending, covered with bases of old leaves.Stem erect,often arcuate at the base,terete,simple,sometimes sparingly branched above,glabrous, sometimes scabrous below,becoming glabrous and viscid above;nodes more or less swollen;middle internodes I.8-5.7cm.long.Caudical and lower cauline leaves rosulate,petiolate,2.I-I0.3 cm.long, I.5-3.5 mm.wide,linear-lanceolate,attenuated into petiole, pruinose and scabrous,base with hyaline margin;other cauline leaves sessile,2.5-5.7 cm.long,I.5-3.0mm.wide,linear-lanceolate, remote,erect,glabrous,base with hyaline margin.Flowers hermaphrodite, erect,solitary,or few in a raceme-like inflorescence.Bracts equal, narrowly linear-lanceolate,acuminate,often plicate,with narrow hyaline serrate-ciliate margin.Pedicels I.9-6.6 cm.long.Calyx 2.6-2.75 cm.long,4.5-5.0mm.diam.,cylindrical tapering towards the base,glabrous,with I0 pinkish seldom obscure anastomosed nerves,in fruit clavate,base pseudo-umbilicate with an annular

ring;teeth unequal,5.0-6.5 X 3.0-3.5 mm.,lanceolate acuminate and ovate obtuse alternating,teeth with hyaline margin.Petal white,2.6-2.7 cm.long;claw I.8-I.9 cm.long,exceeding calyx,smooth, exauriculate;limb 8.0-9.0 X 6.0-6.5 mm.,obcordate-cuneate,bipartite beyond middle into oblong-obovate lobes;ligules two,I.5-2.0 mm. long,triangular to oblong,acute,obtuse or laciniate.Filaments exserted,smooth.Styles 3,exserted,hairy above.Anthophore 8.0-I2.0 mm.long,smooth.Capsule I.4-I.6 X 0.5-0.6 cm.,ovoid-oblong, somewhat longer than anthophore,I/3 exceeding calyx.Seed dark brown,I.8-2.3 mm.long,with flat striate face and obtusely grooved granulate back.Ch.

Type- Turkey-in vineis prope Bound rpatchi inter Karaman et Ermenek Isauriae,Heldr. [holo.G;iso.K']

TURKEY- Prov. Erzerum:Erzerum,June I853,Huet .

Geogr. Endemic .

Habitat-On mountains . Fl.-June and July.

S.caramanica is similar to S.dianthifolia and S.longiflora subsp.staticefolia.It can be distinguished from the former in the manner pointed out in the discussion under that species; and it can be differentiated from the latter by its narrow leaves,smaller flowers,and degree of incision of the petal.S.caramanica also shows a certain similarity to S.armena in the habit and in the indumentum of the caudical leaves.

19. S.peduncularis Boiss.,Diagn.Pl.Nov.Or.,Ser.I,i,30 (1842); Boiss.,Fl.Or.,i,642(1867);Rohrb.,Monogr.Sil., 180 (1868).

Syn. S.arguta Boiss. & Buhse,Aufz.,37(1860);non Fenzl(1842).

Perennial,30.0-62.5 cm.tall.Caudex 2.5-6.0 cm.long, 3.0-5.5 mm.wide,erect,covered with the bases of old leaves,becoming branched and suffruticose.Stem erect,sometimes arcuate at the base, terete,simple or alternately branched from the base upwards, glabrous;middle internodes 2.4-7.5 cm.long. Caudical and lower cauline leaves rosulate,petiolate,2.4-6.1 cm.long,2.5-7.0 mm.wide, lanceolate,sometimes linear-lanceolate or linear,attenuated into petiole,base with hyaline ciliate margin;other cauline leaves sessile,2.7-6.0 cm.long,2.5-8.5 mm.wide,lanceolate or linear-lanceolate,sometimes linear;all leaves 1-nerved,acute,glabrous. Inflorescence a lax panicle;cymules 3-5-flowered or 1-flowered. Bracts unequal,ovate acuminate,with wide hyaline smooth margin. Pedicels of terminal flowers 2.5-5.0 cm.long and those of lateral flowers 2.0- 6.9 cm.long,erect.Flowers hermaphrodite,sometimes pistillate with aborted stamens,erect.Calyx 1.4-1.6(1.8)cm.long, 3.5-4.3 mm.diam.,obconical-cylindrical,glabrous,with 10 more or less obscure anastomosed nerves,base pseudo-umbilicate with an annular ring,in fruit clavate with a constriction below the capsule;teeth 2.8-3.0 X 2.0-2.3 mm.,lanceolate or triangular, acute teeth alternating with obtuse teeth,with hyaline ciliate margin.Petal pink,1.2-1.5 cm.long;claw 7.5-9.0 mm.long equalling calyx,exauriculate;limb 4.5-6.0 X 3.5-4.0 mm.,cuneate,bipartite beyond middle into oblong lobes;ligules two,0.5-0.8mm.long, oblique,obtuse.Filaments included,smooth.Styles 3,thick,exserted

hairy above.Anthophore 4.5-7.0 mm.long,smooth.Capsule 9.0-12.0 X 4.5-5.0 mm.,oblong,nearly twice as long as anthophore,slightly exserted.Seed dark brown,1.3-1.5 mm.long,with flat striate face and grooved tuberculate back.Hs. or Ch.

Type- In Persia in monte Seidkhodji,Aucher 4219 [holo.G;iso.K',BM']

IRAN- Mt.Elbrus,2700m.,yr.1868,Hausskn.;ibid. 3000m.,July 1868, Hausskn.;hills ,South of Tabriz,27-6-1927,Gilliat-Smith 2021; Atropalania,Meshan dag,2200m.,20-6-1924,Grossheim & Schischkin 203.

Geogr. N E Turkey,Iran and Caucasus.

Habitat- On mountains;alt.2200-3000m..Fl.-July.

S.peduncularis,in general habit and shape of the leaves, resembles S.longiflora to some extent,but differs from the latter by the irregular,less prominent panicle,narrow leaves,long slender pedicels,pink coloured flowers,and by the bracts and bracteoles which are ovate acute or acuminate.In the relative length of capsule and anthophore,S.peduncularis differs from S.longiflora, the capsule being twice as long as the anthophore.

20. S.lycica Chowdhuri,sp.nov. Plate 1.;fig.4.

Affinis S.longiflorae subsp.staticefoliae (Sibth.& Sm.) Hayek et S.armenae Boiss.var.scabridulae (Boiss.)Williams; a priore caulibus superne viscidis,forma foliorum basalium diversa, floribus minoribus,laminis petalorum cuneatis (nec obcordatis); ab altera habitu et indumento diverso,forma foliorum,bracteis lanceolatis caudato-acuminatis tota longitudine albo-marginatis

differt.

Herba perennis,compacta,pulvinari-caespitosa,multicaulis, basi suffrutescens,inferne ut folia leviter et laxiuscule papillosa,pilis longis patentibus,superne glabrescens et viscida. Caudex decumbens vel semi-erectus,0.562.7 cm.longus,2.0-5.0 mm. latus,ramosus,ligneus,superne foliosus.Caules floriferi numerosi, 27.0-45.0 cm.alti,erecti,teretes,pallide virescentes,remote foliosi, simplices vel in regione inflorescentiae breviter I-2-ramosi; ramis alternatis;nodis plus minus incrassatis;internodiis mediis 5.3-I0.0 cm.longis.Folia caudicalia numerosa,conferta,conspicua, 3.I-5.3 cm.longa,3.0-5.5 mm.lata,anguste lanceolata vel lineari-lanceolata vel oblanceolata,in petiolum longe attenuata,basi pallide membranceo-dilatata,marcescentia,acuta;folia caulina pauca,remota,reducta,bracteiformia,erecto-patentia,I.5-2.3 cm. longa,lineari-subulata,superiora lanceolata acuminata,tota longitudine membranaceo-marginata,ciliolata.Flores solitarii vel 2-5 ad apicem ramulorum,hermaphroditi.Bracteae et bracteolae subaequales,9.0-I3.0 X 2.3-3.0 mm., foliis caulinis similes,basi trinerves.Calyx I.5-I.8 cm.longus,3.0-3.5 mm.diametro,tubuloso-clavatus,subcoriaceus,glaber,I0-nervius (nervis brunescentibus vel purpurescentibus,superne anastomosantibus),in fructu clavatus, basi annulo circulari pseudo-umbilicatus;dentes 2.8-3.5 X I.8-2.3 mm.,ovati,alternatim acuti et obtusi,albo-marginati ciliolati. Petala I.3-I.65 cm.longa,in sicco brunescenti-flavescentia; unguis 7.5-9.0mm.longus,superne dilatatus,exauriculatus,glaber; lamina 5.5-7.5 X 2.5-3.0 mm.,cuneata,ultra medium in lobos oblongos rotundatos bipartita;ligulae binae,0.7-I.0 mm.longae, triangulares,acutae.Filamenta I.I-1.35 cm.longa,exserta,glabra.

Plate
1

Plate 1-Silene lycica Chowdhuri

Fig.4

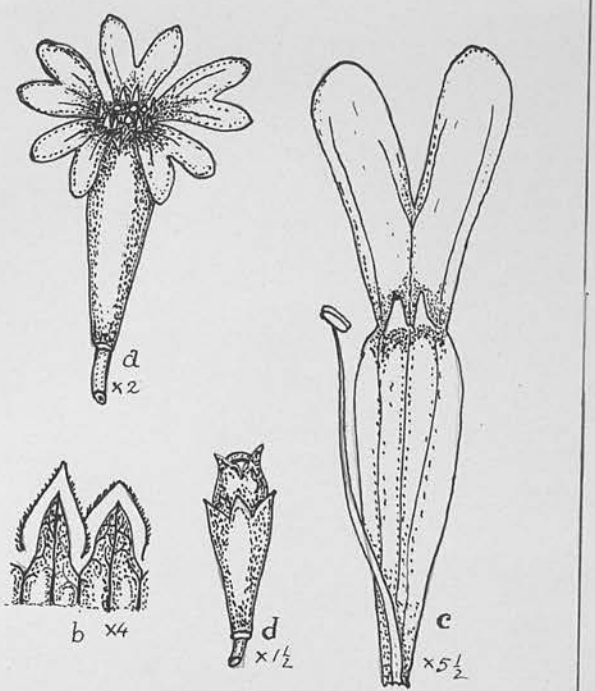


Fig.4.Silene lycica :a-flower;
b-calyx teeth;c-petal;d-capsule.

Styli tres,7.0-8.5 mm.longi,minute pubescentes.Anthophorus 5.0-7.0 mm.longus,glaberrimus.Capsula 9.0-12.0 X 4.5-5.0 mm., oblonga,anthophoro duplo longior,calycem paulo superans.Semina brunea,0.9-1.3 mm.longa,compressa,dorso canaliculata,faciebus plana striata.

TURKEY- Prov. Mugla : Girdev dag' [Eren dag],south side,2000m., 5-8-1949,Davis 13826 [holo.K.;iso.E.]

21. S.armena Boiss.,Diagn.Pl.Nov.Or.,Ser.I.i,29 (1842).

Caespitose perennial,(8.0)15.0-50.0 cm.tall.Root woody, deepseated,with a divided crown,multicipital,often bearing adventitious buds.Caudex 5.0-13.5 cm.long,3.0-6.5 mm.wide,erect,ascending, sometimes prostrate to decumbent,becoming branched and suffruticose, covered with brown bases of old leaves.Stem slender,terete,more or less leafy,erect,sometimes arcuately erect or geniculate at the base,simple below,becoming sparingly and alternately branched from the middle upwards,either glabrous and not viscid throughout or pruinose-scabrous below becoming glabrous and viscid above; middle internodes (2.0) 9.5-12.3 cm.long.Caudical and lower cauline leaves rosulate,petiolate,3.5-9.7 cm.long,1.0-2.5(4.5) mm.wide, linear-lanceolate to linear,attenuated into petiole,base with hyaline margin,pruinose-scabrous;other cauline leaves sessile, erect and more or less adpressed,sometimes spreading,1.7-7.0 cm. long,0.5-3.5 mm.wide,linear or linear-acuminate,glabrous;all leaves acute or acuminate,1-nerved,serrate-ciliate towards the base.Inflorescence a panicle;cymules usually alternate,1-flowered,sometimes 2-3-flowered,sometimes the inflorescence is

reduced. Bracts and bracteoles equal, lanceolate or ovate-lanceolate, acuminate, with hyaline ciliate margin. Pedicels 1.0-2.8 cm. long, erect, slender. Flowers hermaphrodite, sometimes pistillate with aborted stamens, erect. Calyx 1.3-1.9 (2.5) cm. long, 3.0-3.5 mm. wide, cylindrical-clavate, glabrous, often purplish, with 10 more or less obscure anastomosed nerves, in fruit clavate with constriction below the capsule, base pseudo-umbilicate with an annular ring; teeth 2.0-3.3 X 2.0-2.8 mm., lanceolate or ovate, sometimes obovate, acute teeth alternating with obtus or retuse teeth, teeth with hyaline ciliate margin. Petal yellowish green, 1.4-1.9 cm. long, claw 9.5-12.0 mm. long, exauriculate, smooth, sometimes sparingly ciliate; limb 4.5-8.0 X 2.8-3.5 mm., cuneate, bipartite to the middle into oblong-linear lobes; ligules two, 0.7-1.3 mm. long, ovate, obtuse or oblique and triangular. Filaments exserted, smooth. Styles 3(4-5), exserted, hairy above. Anthophore 4.5-9.0 mm. long, smooth. Capsule 1.0-1.25 X 0.4-0.5 mm., ellipsoidal, twice as long as anthophore, ½ exserted. Seed brow, 1.3-1.8 mm. long, with flat striate face and grooved tuberculate back. Ch. or Hs.

Key to the varieties.

Leaves 1.0-2.5 mm. wide, linear, often plicate; clyx teeth ovate; plants glabrous and not viscid .....a.var. armena

Leaves 2.5-3.5(4.5)mm. wide, linear-lanceolate, flat; calyx teeth lanceolate; plants pruinose-scabrous below, becoming glabrous & viscid above .....b.var. scabridula

var. armena . Boiss.,Fl.Or.,i,643(1867);Rohrb.,Monogr.Sil.,180(1868).

Syn.S.armena Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,29(1842);
non sensu Rohrb.,Monogr.Sil.,180(1868).
S.staticefolia Fenzl in Ky.Pl.Exs.no.360(1853)ms.
S.Dschabanica C.Koch,Herb.Berol.ex Rohrb.,Monogr.Sil.,
180(1868).
S.filipes Freyn & Sint.in Bull.Herb.Boiss.,iii,98(1895).

Plants tall,branched,glabrous and usually not viscid.Leaves 1.0-2.5 mm.wide,linear,sometimes linear-lanceolate,often plicate. Clyx teeth ovate.

Type- Turkey-in Armenia circa Erzeroum,Aucher 427 [holo.G.;iso.K!.]

TURKEY- Prov.Erzerum:Erzerum,Feb.1836,Montb.2524;ibid.June1853, Huet;ibid.Zohrab154.Prov.Gumusane:Bayburt,29-6,10-7-1862,Bourg 41; Gumusane (Aktasch)Argyri dag,14-7-1894,Sint.5943c;Karahissartasch, 26-6-1894,Sint.5943.

b. var. scabridula (Boiss.)Williams in Journ.Linn.Soc.,xxxii,139(1896).

Syn. S.scabridula Boiss.,Fl.Or.,i,643(1867).
S.armena Bal.Pl.d'Or. 1047 ex Rohrb.,Monogr.Sil.,180(1868);
non Boiss.(1867).

Plants of low stature,sparingly branched,greyish below with short hairs,becoming glabrous and viscid above.Leaves 2.5-3.5(4.5) mm.wide,lanceolate or linear-lanceolate,flat.Calyx teeth lanceolate.

Type- Turkey-in montis Ali dag,Cappadociae regione alpina inferiori Bal. [holo.G.]

TURKEY-Prov.Hatay:Nur daglari,Duldul dag,1500-2100m.,July1908, Harad.235,Nur daglari (Amanus)Kushji dag,1500-1900m.,Aug.1908, Harad.2511.Cilician Taurus,Mt.Gisyltepe,2400m.,14-7-1853,Ky.360; sine loco,yr.1838,Ky.77.

Geogr.(of sp.) Endemic to Turkey.

Habitat - On mountains;alt. 1500-2400m..Fl.-July-Aug.

22. S.serrulata Boiss.,Fl.Or.,i,643 (1867);Rohrb.,Monogr.Sil.,181 (1868);Williams in Journ.Linn.Soc.,xxxii,139(1896).

Perennial,18.0-56.6 cm.tall.Caudex slender,2.0-6.7 cm. long,3.0-5.0 mm.wide,erect or ascending,branched,covered with bases of old leaves.Stem erect,often arcuate at the base,terete, leafy,simple or sparingly and alternately branched below,generally branched above,glabrous;nodes more or less swollen;internodes (middle) 2.5-8.3 cm.long. Caudical and lower cauline leaves rosulate,petiolate,1.7-3.9 cm.long,1.1-2.8 mm.wide,linear-lanceolate to linear,attenuated into petiole,base with hyaline margin;other cauline leaves sessile,many,conspicuous,1.9-4.8 cm.long,1.5-6.0 mm.wide,lanceolate,oblanceolate or linear-lanceolate,seldom linear,tapering at the base,sometimes more or less fasciculate; all leaves acute,often pointed,serrate-ciliate,ventral surface scabrous or glabrous,dorsal surface scabrous or puberulent especially on the nerves.Inflorescence a panicle;cymules alternate, usually 1-flowered,sometimes 2-3-flowered.Bracts & bracteoles equal,lanceolate,linear-lanceolate or ovate-lanceolate,acute to acuminate,with wide hyaline ciliate margin.Pedicels of terminal flowers 5.0-20.0 mm.long,and those of lateral flowers 2.5-4.9 cm. long,erect or ascending.Flowers hermaphrodite,erect.Calyx 1.7-2.0

cm.long,3.5-4.0mm.diam.,cylindrical-clavate,pinkish,glabrous,with 10 anastomosed nerves,base pseudo-umbilicate with an annular ring, in fruit clavate with constriction below the capsule;teeth 2.3-3.3 X 2.0-3.0 mm.,ovate,sometimes obovate,acute teeth alternating with obtuse or round teeth,teeth with hyaline ciliate margin.Petal white,1.6-192cm.long;claw 9.0-12.0 mm.long,exceeding calyx,smooth, exauriculate;limb 5.0-7.3 X 4.0-6.0 mm.,obcordate-cuneate,bipartite to the middle into obovate-oblong lobes;ligules two,0.7-1.3 mm.long, oblong,obtuse.Filaments exceeding claw,smooth.Styles3,exserted, smooth.Anthophore 7.0-9.0 mm.long,smooth.Capsule 1.0-1.5 X 0.4-0.53 cm.,oblong,twice as long as anthophore,more or less potruding calyx.Seed dark brown,1.5-1.8 mm.long,with flat striate face & grooved tuberculate back. Hp. or Ch.

Type- Turkey-in collibus Lyciae prope Elmalu,Bourg.56 [holo.G.; iso.K'. E'.]

TURKEY-Prov.Antalya:Elmali,14-7-1883,Pichler;Calbali dag,at Tepe Delen yayla,1700m.,13-71949,Davis15253;Tepe Delen yayla,July1949, Atilla;ibid. May 1951,Atilla .

Geogr. Endemic.

Habitat- On hills;alt. 1700m.. Fl.-May-July.

S.serrulata seems probably to be related to S.armena Boiss. but at the same time to be connected with S.peduncularis Boiss. in the important habitat and the caudex characters,but it differs from both in the colour of its petals which have an exserted claw and obcordate-cuneate limb,and lastly by the relative length of capsule and calyx.

S.serrulata appears to be a connecting link between

two subsections,as the caudical & lower cauline leaves are often small and disappear from the old plants,but its close similarity to S.armena Boiss. and S.peduncularis Boiss. favours its inclusion within subsection Longiflorae .

SUBSECTION 5B CHLORIFOLIAE

23. S.laxa Boiss. et Ky.,Fl.Or.,i,638 (1867);Rohrb.,Monogr.Sil., 179 (1868).

Tall perennial,70.0-100.0 cm.high. Root vertical,woody, with a multicipital crown.Caudex short,stout,becoming branched & suffruticose,sometimes covered with bases of old leaves.Stem erect, terete,greenish,leafy,simple below,becoming branched above,seldom branched throughout,glabrous,viscid above;nodes more or less swollen;middle internodes 4.3-8.5 cm.long.Caudical and lower cauline leaves small,rosulate,petiolate,withering at anthesis; other cauline leaves large,conspicuous,sessile,3.2-6.2(7.5) cm.long, 1.5-3.5 (5.3) cm.wide,ovate-lanceolate or oblong-ovate with cordate base,upper ones ovate acuminate,1-nerved,glabrous,glaucous. Inflorescence a panicle;cymules opposite,ascending,usually 3-5-flowered. Bracts equal,ovate,acuminate;bracteoles small,lanceolate, acuminate,with hyaline scarious margin.Pedicels 4.0-13.0 mm.long, erect,slender.Flowers hermaphrodite,erect.Calyx(1.2) 1.5-2.5 cm.long,3.0-4.3 mm.diam.,cylindrical with tapering base,white, glabrous,with 10 obscure anastomosed nerves;base pseudo-umbilicate with an annular ring,in fruit clavate with narrow base;teeth 2.5-3.8 X1.5-2.3 mm.,unequal,lanceolate and acute teeth alternating with

ovate and obtuse teeth,teeth with hyaline scarious margin.Petal 1.3-2.0 cm.long;claw 8.5-12.5 mm.long,exceeding calyx,smooth, exauriculate;limb 4.5-7.5 X 4.0-7.0 mm.,obcordate,bipartite into oblong-obovate lobes;ligules absent.Filaments exserted,smooth. Styles 3,exserted,smooth.Anthophore 6.0-9.5 mm.long,smooth.Capsule 1.3-1.7 X 0.5-0.6 mm.,oblong,twice as long as anthophore,slightly exserted.Seed brown,triangular or rectangular reniform , 2.0-2.5 (3.0) mm.long,with flat face and grooved tuberculate back.Ch.

Type- Turkey-in saxosis praeruptis ad radices australes montis Bingoel dagh prope Goschkar Armeniae Ky.376 [holo.G.;iso.K!.]

TURKEY- Prov.Hakkari:Cilodag at Diz deresi,1710m.,6-8-1954,Davis 23922;Cilo dag in gorge between Cilo yayla & Diz deresi,2400m., 10-8-1954,Davis 24268 .Prov.Van:Erek dag,2250m.,18-8-1954,Davis 22923. Prov.Bitlis:Suphan dag above Adilcevas,28-8-1954,Davis 24703 .

Geogr.Endemic to Turkish Kurdistan .

Habitat- On mountains;alt. 1700-2400m..Fl.-July & Aug.

S.laxa is likely to be confused with S.chlorifolia Boiss.; indeed,the habit of the two plants is so similar that resort to floral character is necessary for certain identification.Whereas S.laxa has large leaves,small flowers with a cylindrical calyx, obcordate and eligulate petal,and the capsule twice as long as the anthophore;S.chlorifolia has comparatively smaller leaves, larger flowers with a cylindrical-clavate or clavate calyx,petal obcordate- or obovate-cuneate and ligulate,and the capsule as long as or 1½ times longer than the anthophore.In floral characters it approaches S.caesarea Boiss.& Bal.,but differs from the latter

by the character of leaf,shape of petal,and relative length of capsule and anthophore.

24. S.chlorifolia Sm.,Ic.Ined.,i,14.t.13 (1789);Boiss.,Fl.Or.,i, 640 (1867);Rohrb.,Monogr.Sil.,177(1868).- Curtis, Bot.Mag.,t.807(1805);Sweet,Brit.Fl.Gard.,vi,t.263 (1834).

Syn. S.Smithii Gmel.,Syst.Nat.,i,714(1796);non Boiss.& Heldr. (1853).

S.perfoliata Otth in DC.,Prodr.,i,384(1824).

S.chlorifolia var.macrocalyx Hausskn.& Bornm.in Bornm., It.Turk.,no.952(1889)ms.

Perennial, 13.0-98.0 cm.tall,glabrous,glaucous.Root vertical, deepseated,woody,often fusiform,with a multicipital crown.Caudex 3.0-18.5 cm.long,2.0-12.0mm.wide,ascending,sometimes decumbent, becoming branched and suffruticose,with leaf scars and few vegetative buds.Stem erect,ascending-erect,sometimes arcuate at the base,terete,leafy,paniculately or dichotomously branched from the middle upwards,sometimes branched throughout,viscid above; nodes more or less swollen;middle imternodes 2.9-9.5 cm.long Caudical and lower cauline leaves rosulate,petiolate,often withering at or after anthesis,2.5-4.3 cm.long,5.0-18.0 mm.wide,oblong- , oblanceolate-,lanceolate- or ovate-spathulate,attenuated into petiole,base with hyaline margin;other cauline leaves conspicuous,in several pairs,sessile,1.6-4.5 cm.long,1.1-3.5 cm.wide,cordate, clasping the stem;all leaves 1-nerved,acute to acuminate,seldom obtuse or mucronate,margin especially of the lower ones usually

serrate-ciliate. Inflorescence a lax panicle with opposite or alternate 1-3(5)-flowered cymules. Bracts & bracteoles equal, like the cauline leaves. Pedicels 1.5-11.5 cm. long, erect or ascending, stout. Flowers hermaphrodite, erect. Calyx 2.3-4.2 cm. long, 6.3-7.5 mm. diam., cylindrical-clavate or clavate, glabrous, with 10 more or less obscure anastomosed nerves, in fruit clavate with a constriction below the capsule, base pseudo-umbilicate with an annular ring; teeth 2.5-4.0 X 2.0-4.0 mm., triangular or lanceolate acute teeth alternating with ovate obtuse or obovate retuse teeth, teeth with wide hyaline ciliate margin. Petal livid white to greenish cream colour, 2.84-4.2 cm. long; claw 2.0-2.7 cm. long, exserted, smooth, exauriculate; limb 8.5-15.0 X 5.5-13.0 mm., obcordate or obcordate-cuneate, more or less thick towards the base, bipartite into obovate or oblong-ovate lobes (4.0-8.5 X 4.3-8.0 mm.,); ligules two, 0.7-1.0 mm. long, oblong, obtuse, round, denticulate, less often acute or laciniate, rarely minute or absent. Filaments exserted, smooth. Styles 3, exserted, smooth or hairy. Anthophore 7.0-17.0 mm. long, smooth or scabrous. Capsule 1.6-2.1 X 0.6-0.85 cm., oblong, 1-1½ as long as anthophore, slightly exserted. Seed grey brown, 2.8-3.5 mm. long, with flat striate face and grooved tuberculate back. Hp. or Ch.

Type- In Armenia, Tournefort.

TURKEY- Prov. Erzincan: Kemaliye at Aergii, 23-5-1890, Sint. 2327; Erzincan, 14-7-1940, Bagada. Prov. Gumusane: Bayburt, 20-7-1862, Bourg. 48. Prov. Erzerum: Erzerum, Zohrzb 163 . Prov. Kastamonu: Beschtscham, 3-6-1892, Sint. 4079 . Prov. Cankiri: Cakmakli dere opp. to Cankiri, 800m., 16-9-1929, Bornm. 13331. Prov. Ankara: Bergsteppe, Weinberge, 25-6-1932, Kotte 109; Beynam, 300m., 5-7-1947, Davis 13061; ibid. 1200m., 22-6-1945, Kasap.; Hacikadun valley, nr. Kecioren, 11-6-1952, Davis 13734; Finesa Derosi, 31-5-1936, Gassner 454; Hanbadin, 14-6-1944, Kasap.; Zinaat Mektebis, 8-6-1928, Muller 120. Prov. Amasya: in mt. Logman, 4-500m., 15-5-1889, Bornm. 2810.

Prov.Hakkari:Zab gorge,nr.Kalslans,3-8-1954,Davis 23861 ; Zab gorge,30 miles S.of Baskali,2-8-1954,Davis 23814 .Prov. Van: dt.Gevas,Artos dag,2850m.,16-7-1954,Davis22773 .Prov.Bitlis: Nemrut dag,west foot,1800m.,23-7-1954,Davis 23581; Pelli dag,above Pelli,2550m.,7-71954,Davis 22457.Prov.Elazig:Maden-Hazar Gol, 1200m.,22-6-1954,Davis 22052.

Prov.Maras:Akir dag,840m.,July 1907,Harad.1537. Prov.Mersin: Gulnar,Gulnar dere,6-6-1950,Atilla .Prov. Konya/Mersin:between Gulnar and Ermenek,10-6-1950,Atilla.Cilician Taurus,sine loco,Ky. 75;ibid. Montb.;Bulkar daglari,mt.Gisyl deppe,2400m.,21-7-1853, Ky.108a.Prov.Antalya:Elmali,3-6-1860,Bourg.44. Prov.Burdur/Isparta: between Burdur & Egridir,June1845,Heldr..Prov.Lidia: at mt.Sipylos and at Manisa,11-6-1854,Bal.98 ;at mt.Sipylos,July1842,Boiss. . Prov.Seyhan:Pozanti,3km.from Guneyi,800m.,Demiriz I297 ;Candir Alani,11-6-1950,Atilla .

SYRIA- Antilebanon-Bludan,1350m.,6-8-1945,Davis 10071;ibid.6-8-1945, Davis 9734.

IRAQ- Valley between Gunda Shor and Darband,1400m.,25-8-1948 Gillett 12403.

IRAN- Seidobad,between Teheran & Tabris,June 1859,Bunge ;at Kuh-Ajub,19-5-1845,Ky.399;nr.Isfahan,1500m.,May 1941,Tott 1022; Nagharah Khaneh,nr.Ravy,7-8-1934,Field & Lazar 1028;north Iran,sine loco,Aucher 4218 ;Kurdistan Assyriaca,Riwandous,in mt.Sakri-Sakran, 2100m.,24-6-1893,Bornm.984; 2 m. W.of Ushnu,1950m.,30-5-1929, Cow. & Darl.1424;gorge,3m. N W of Nawi,1800m.,25-51929,Cow.&Darl. 2433;Tang,nr.Asbadin,17-5-1885,Stapf 1323; Mt.Elwend,a 1882,Polak; Mt.Elbrus,in Kic kuh opp. Keredj,1600-2200m.,30-5-1937,Rechinger 546;Bakhtiari,Sawyer 13077; ibid. Sawyer 13193.

Geogr. Greece,Turkey,Syria,Iraq,Iran and Caucasus.

Habitat- Stoney thickets and woods,200-2850m..Fl.-May-Aug.

For discussion,see S.swertiifolia.

25. S.caesarea Boiss.et Bal.,Diagn.Pl.Nov.Or.,Ser.11,vi,31(1859); Boiss.,,Fl.Or.,i,638 (1867);Rohrb.,Monogr.Sil., 179 (1868).

Perennial,50.0-83.0 cm.tall,with suffruticose base. Caudex short,stout,erect,branched,covered with bases of old leaves Stem erect,terete,greenish,leafy,simple below,becoming

branched above,sometimes branched throughout,glabrous,viscid above; nodes more or less swollen;middle internodes 2.0-5.1 cm.long. Caudical and lower cauline leaves rosulate,petiolate,small, 2.5-4.9 cm.long,4.0-6.0 mm.wide,withering at anthesis;other cauline leaves sessile,numerous,conspicuous,5.3-7.4 cm.long,7.0-15.0 mm.wide, oblong-lanceolate,lanceolate,sometimes ovate-lanceolate,acute;all leaves glabrous,1-nerved.Inflorescence a panicle;cymules opposite, spreading,1-3-flowered.Bracts equal,lower ones linear-lanceolate, upper ones linear;bracteoles ovate-lanceolate,both with narrow hyaline margin towards the base.Pedicels 7.0-15.0 mm.long,erect or ascending. Flowers hermaphrodite,erect.Calyx 2.0-2.2 cm.long,3.5-4.0 mm.diam., cylindrical-clavate,pinkish,with 10 anastomosed nerves,in fruit clavate with a constriction below the capsule,base pseudo-umbilicate with an annular ring;teeth 2.5-3.0 X 1.8-2.3 mm.,unequal, ovate obtuse alternating with lanceolate acute,teeth with wide hyaline scarious margin. Petal 1.9-2.2 cm.long;claw 1.35-1.5 cm.long,more or less exceeding calyx,smooth,exauriculate;limb 5.5-7.0 X 3.3-4.0 mm.,cuneate,bipartite to the middle into oblong lobes;ligules absent.Filaments exserted,smooth.Styles 3,slightly exserted, smooth.Anthophore 8.0-10.0 mm.long,smooth.Capsule 1.3-1.5 X 0.5-0.6 cm.,oblong,1½ as long as anthophore,1/3 of the capsule protruding calyx.Seed dark brown,1.5-1.8 mm.long,with flat striate face and grooved tuberculate back.Ch.

Type- Turkey-in cacumine montis Ali dag,supre Caesaream Cappadociae alt.1700m.,Balansa [holo.G.;iso.K'.,BM'.]

TURKEY- Prov.Elazig:Elazig,July1945,Saye .Prov.Antalya: at

Yemiden above Elmali,9-8-1860,Bourg.57.

Georg. Endemic to Turkey.

Habitat- In fields and on hills.Fl.-July & Aug.

The nearest species are S.swertiifolia Boiss. and S.laxa Boiss. & Ky.,especially the former.It is distinguished from S.swertiifolia,with which it has in common leaves of nearly the same shape,by its branched stem,smaller and narrower calyx, eligulate and cuneate petal,and capsule 1/3 exserted beyond the calyx.It is distinguished from S.laxa by its leaf shape and petal with a cuneate limb.Nevertheless,these three species, together with S.chlorifolia ,are very nearly related to each other.

26. S.swertiifolia Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,32 (1842).

Perennial,25.0-55.0 cm.tall. Root vertical,stout,woody, with a multicipital crown.Caudex erect,ascending,sometimes horizontal,3.0-23.0 cm.long,3.0-6.0 mm.wide,simple or branched suffruticose,bearing vegetative buds,sometimes covered with bases of old leaves.Stem erect,sometimes arcuate at the base,terete,leafy, often purplish below,usually branched,glabrous,glaucescent,more or less viscid above;nodes somewhat swollen;middle internodes 3.5-7.2 cm.long.Caudical and lower cauline leaves rosulate,petiolate, 2.3-10.0 cm.long,(3.0) 8.0-25.0 mm.wide,ovate- or oblong-spathulate,sometimes lanceolate- or oblanceolate-spathulate, attenuated into petiole,base with hyaline margin;middle cauline

leaves subsessile,2.0-6.5 cm.long,(3.0) 10.0-23.0 mm.wide,ovate- or obovate-lanceolate or oblanceolate;upper leaves lanceolate to linear-lanceolate,sessile;all leaves acute,sometimes obtuse or nearly so,glabrous,1-nerved,with serrate-ciliate margin. Inflorescence a lax panicle;cymules usually alternate,normally 1-,sometimes 2-3-flowered.Bracts linear-lanceolate or linear. Pedicels (0.3)1.0-8.0 cm.long,erect or ascending.Flowers erect, hermaphrodite.Calyx 2.2-4.2 cm.long,6.0-7.2 mm.diam.,cylindrical-clavate,glabrous,often pinkish,with 10 anastomosed somewhat obscure nerves,in fruit clavate with a constriction below the capsule,base pseudo-umbilicate with an annular ring;teeth 2.5-5.0 X 2.3-3.5 mm., triangular acute or acuminate alternating with ovate obtuse or obovate emarginate ,teeth with hyaline ciliate margin.Petal greenish white,white or pinkish,2.5-3.7 cm. long;claw 1.3-2.1 cm.long,exserted,smooth,exauriculate;limb 1.2-1.6 X 0.6-0.11 cm., obovate- or obcordate-cuneate,bipartite (1/3 -1/2) into obovate lobes;ligules two,ovate acute,oblong-obtuse or linear,sometimes absent or represented by thickened outgrowths.Filaments exserted,smooth.Styles 3,exserted,hairy, sometimes with the filaments pinkish.Anthophore 0.7-1.9 cm.long, smooth.Capsule 1.2-2.0 X 0.6-0.83 cm.,oblong,as long as or 1½ X as long as anthophore,included,sometimes slightly exserted.Seed brown,2.5-3.3 mm.long,with flat face and grooved granulate back. Ch.or Hp.

Key to the varieties.

Pedicels more than 1.0 cm. in length:

Cauline leaves 0.8-25.0 mm.wide ..... a. var.swertiifolia

Cauline leaves 3.0-5.0 mm. wide.....b.var.stenophylla

Pedicels less than 1.0 cm.(3.0-8.5 mm.) in length

..... c.var.brevipes

a. var. swertiifolia . Boiss.,Fl.Or.,i,640 (1867);Post,Fl.Syr.Pal. & Sinai.,ed.2.i,186(1932) -Bouloumoy,Fl.Lib. & Syr.,t.47.fig.7 (1930).

Plants branched;branches long.Cauline leaves 8.0-25.0 mm.wide.Calyx 6.5-7.2 mm.in diam.

Type- Turkey-in Cappadocia Orientali et monte Demawend Persiae Aucher 451 et 4215 [holo;G.;iso.K! BM!.]

TURKEY-Prov.Amasya:Hadjin,north of Kleinasien,Manissad.863.Prov. Mardin:Mardin,25-6-1888,Sint.1158;ibid.3i-5-1888,Sint.870 . Karakuyu,June1954,Atilla. Prov.Maras: Akir dag (Akher),990m., 22-5-1934,Balls 1134;ibid. 900m.,2-5-1934,Balls b956 .Prov. Gaziantep: vill.Harunji (Amanus),3-500m.,July1911,Harad.3557. Prov.Hatay:between Medyk & Nagara,above Arsus,5-7-1862,Ky.141; Nur daglari (Amanus),July & Aug.,Post;ibid.,1350m.,July1906, Harad.782 . Cilician Taurus:at Pozanti,yr.1896,Siehe 392;vill. Gulek Boghar,July1855,Bal..Pamphilia:sine loco,yr.1845,Heldr.

SYRIA-Ul-Washan to Jab Bilas,29-1-1890,Post ;Mt.Cassia,south of Kessab,Post ;between Aleppo & Malatia,June 1834,Montb.1940.

PALESTINE- 30 km. south of Anteoch,800m.,8-6-1938,AC.20382; Top of Wadi Kedron,900m.,Davis 5031.

IRAQ- Pir Omar Gudrun,July1867,Hausskn.;Jebel Baradost,nr.Diana Rowandiz,28-6-1936,Field & Lazar 904;Zokleo Pass,750m.,25-4-1932, Guest 2263;Zawitah gorge,900m.,26-7-1933,Guest 3713;ibid.1010m., 28-7-1933,Guest 4615;Jebel Avroman,above Darimar,1650m.,8-6-1948, Gillett 11842.

IRAN-Safin dagh above Shaqlawa,12-1400m.,9-5-1947,Gillett8164; ibid. above Schaklawa,1000m.,20-5-1893,Bornm.983;Tabriz,26-7-1926, Gilliat-Smith 1761;nr.Tabriz,a1927,Gilliat-Smith 1844;mt.Gherons, Aug.1903,Bornm.;Elbrus Demawend,2300m.,18-7-1902,Bornm.6383;

ibid.mt.Totschal,2400m.,4-6-1902,Bornm.6381;Prov.Schahrud,sine loco,May 1858,Bunge .Elbrus,Aucher 4216;ibid.Passgala,24-7-1843, Ky.434.Kuh Deana,13-6-1843,Ky.509.Prov.Khorasan,between Meshhed & Turbate Haidari in mt.Robat ,1700m.,10-7-1937,Rechinger11151.

b. var.stenophylla Boiss.,Fl.Or.,i,641 (1867).

Plants sparingly branched;branches short.Cauline leaves 3.0-5.0 mm.wide.Calyx 6.0-6.3 (6.8) mm. in diam. Claw conspicuously exserted.

Type- in graminosis cretaceis ad Tulluck prope Aintab Syriae Hausskn. [holo.G.;iso.K'.]

SYRIA- Below Baalbek,1200m.,14-3-1945,Davis9729.

PALESTINE-Jerusalem,10-6-1928 R.G.513.

IRAQ-12 km. E.of Chemchemal,800m.,3-6-1948,Gillett & Rawi11615.

IRAN- Kuh Sefid opp. Keredj,1-6-1937,Rechinger 625 ;between Hamadan & Kermanshah,16-8-1937,Rechinger 2132;Kisil Arwat,Karakala, nr.Kutanak,14-5-1901,Sint.1724;valley of Livan,Sept.1925 Gilliat-Smith 1280.

c.var. brevipes Post,Fl.Syr.Pal. & Sinai,ed.2.i,186(1932).

Plants sparingly branched;branches short.Pedicels 3.0-8.5 mm.long.Calyx 6.0-6.5 mm.in diam..

Type- Syria-Wadi-ul-karn,Antilebanon,7-8-1891,Post [holo. Jeru.; iso.K'.]

Geogr. (of sp.) Caucasus,Turkey,Syria,Palestine,Iraq and Iran.

Habitat (of sp.)- Stoney thickets and woods;alt. 300-2300m..

Fl.-May-July.

An extensive study of the available herbarium material of S.chlorifolia,S.swertiifolia,S.makmeliana and S.Schimperiana has led me to consider that these taxa are not conspecific or varieties of S.chlorifolia,but to recognize them as distinct species.This conclusion finds support not only from morphological features,but also from geographical and ecological considerations

Rohrbach reduced S.swertiifolia,S.makmeliana and S. Schimperiana to varieties of S.chlorifolia .Williams also supported their varietal ranks.Boissier in his Flora Orientalis [vol.i,640 (1867)] retained them as distinct species.Post and Schischkin also treated them as separate species.

All 4 species have to some extent similar floral characters,but they differ in the character of leaves and stem, and also in the relative length of capsule and anthophore.Apart from these criteria they also differ in the detailed character of petal and calyx,which I have discussed below.S.chlorifolia and S.swertiifolia grow in stony thickets and woods,and their distributional range being entirely coextensive. S.makmeliana is a subalpine plant from Lebanon and Palestine. S.Schimperiana is restricted to Arabia Petrea and grows in rocky places.S.chlorifolia and S.swertiifolia,having the same distributional range,must be considered either as synonymous or as separate species,but not as subspecies.The other two taxa have distinct geographical distributions and ecological preferences.

Apart from these geographical and ecological considerations these taxa are well differentiated on the morphological characters. The leaves,which I consider as the most reliable distinguishing character discernible in herbarium material,differs both in

Fig. 5.

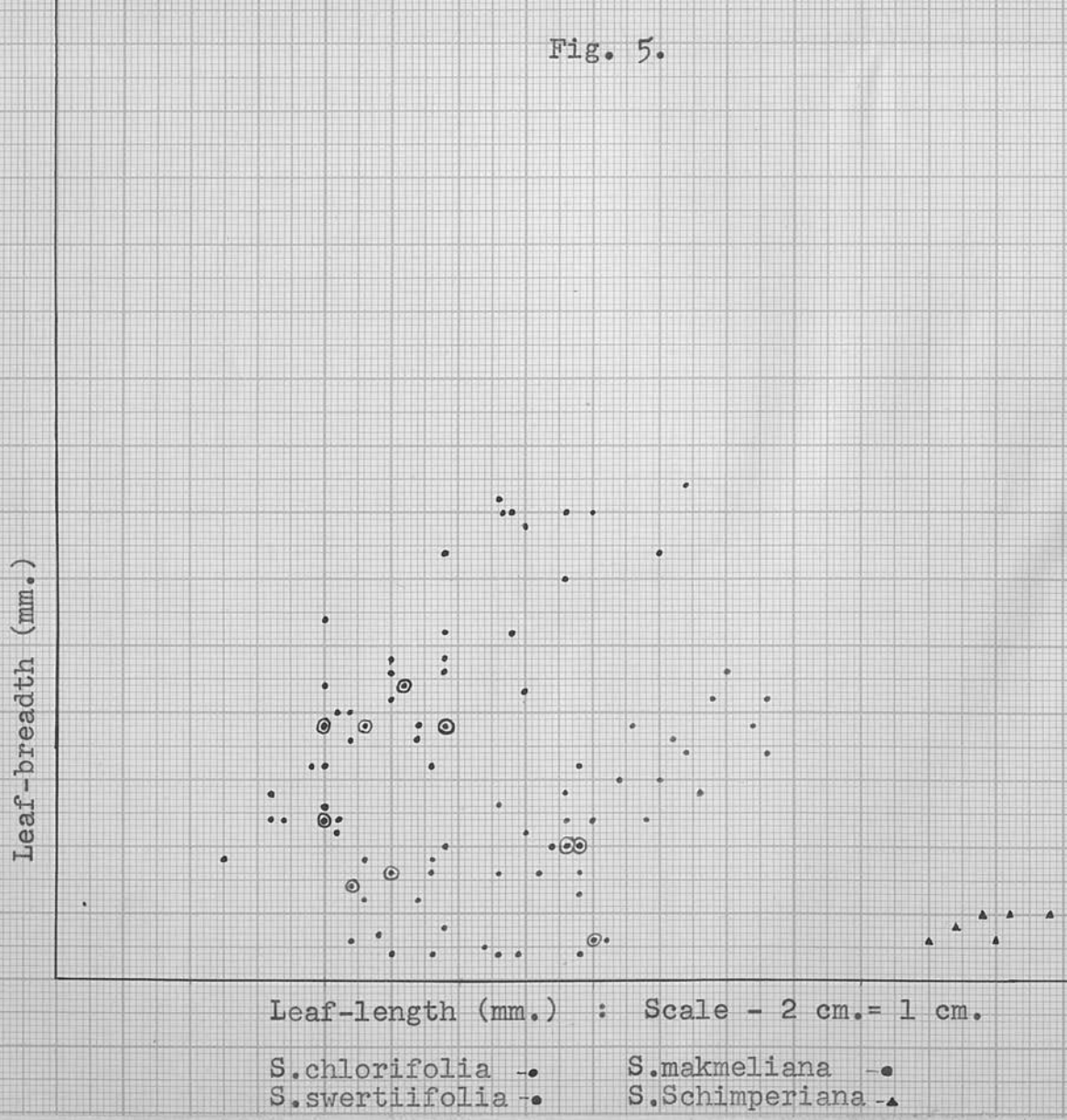


Fig.5.Scatter diagram showing correlation of leaf length & breadth (flowering stems) of S.chlorifolia,S.swertiifolia,S.makmeliana & S.Schimperiana .

shape as well as in size in all the 4 species.The scattered diagram (fig.5) shows the leaf width in each species plotted against length. Different colours have been used for these species and the ringed points indicate two gatherings.It will be seen that a positive correlation is shown in all except S.makmeliana, and that the taxa occupy distinct and separate positions in the diagram.The limits between the taxa have been defined by reference to floral characters.The shape of the leaf itself is quite diagnostic.In S.chlorifolia the cauline leaves,especially the upper ones (including the bracts) are ovate with cordate base, and are many & conspicuous.While in S.swertiifolia these leaves are ovate-lanceolate or oblanceolate,seldom ovate but never with cordate base.Occasionally a few specimens lie between S.chlorifolia and S.swertiifolia in the leaf character.These specimens may be hybrids between these two species,and tend to obliterate the specific limit between them.They may be due not to hybridization, but to the variation inherent in the species (S.swertiifolia); since the specific floral differences are maintained and the plants are fertile.

S.makmeliana has got the lower cauline leaves closely spaced and linear-lanceolate,while the upper ones are reduced, remote and bract-like.Whereas in S.Schimperiana the upper leaves are linear or oblong-linear,and like S.chlorifolia are many and conspicuous. S.makmeliana thus not only in leaf shape,but also in the distribution of the leaves on the stem,stands apart.

In addition to this character,the statistical data obtained from the floral parts readily support the conclusion that these taxa are separate.

Fig. 6.

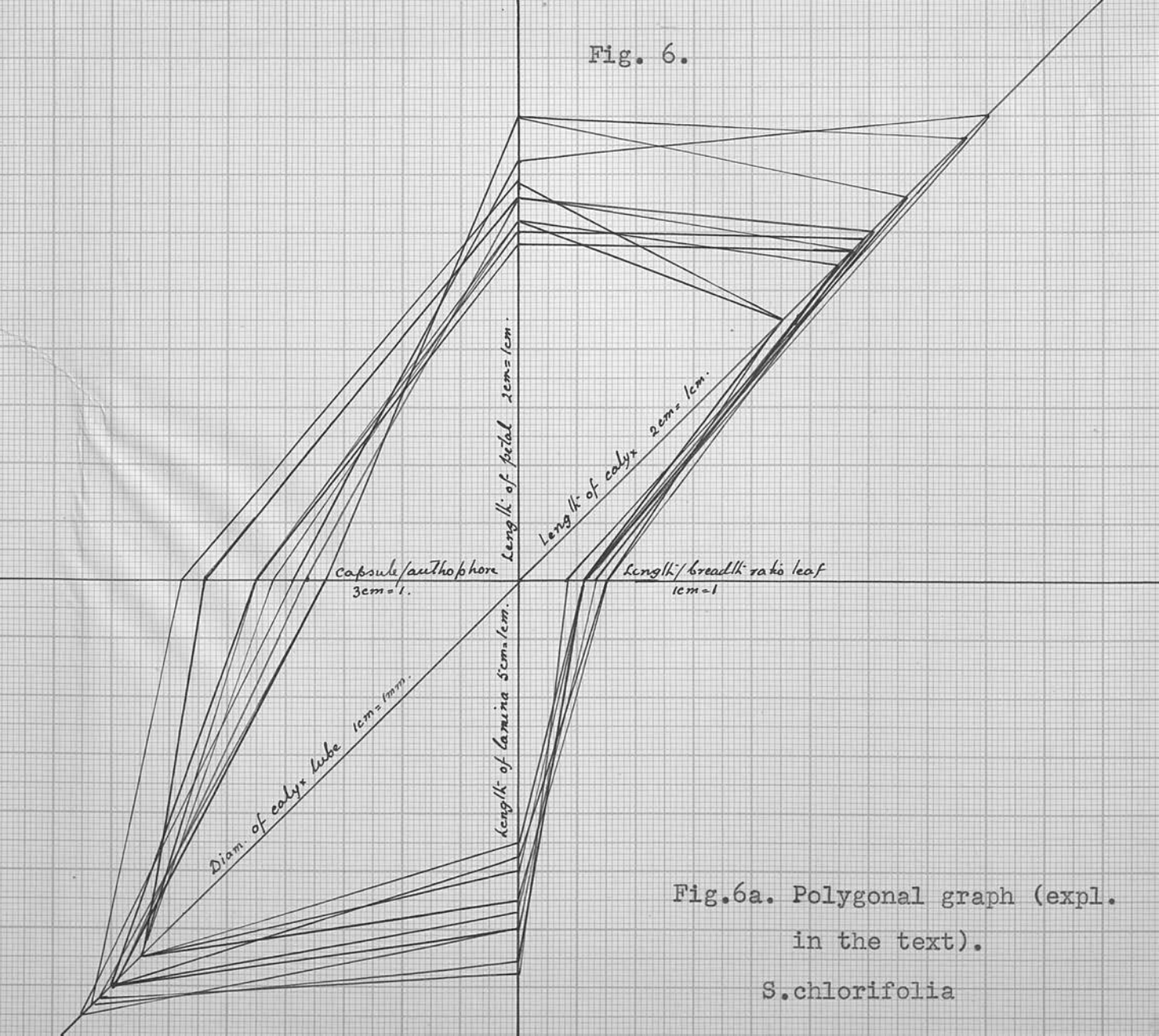


Fig.6a. Polygonal graph (expl. in the text).

S.chlorifolia

Fig. 6.

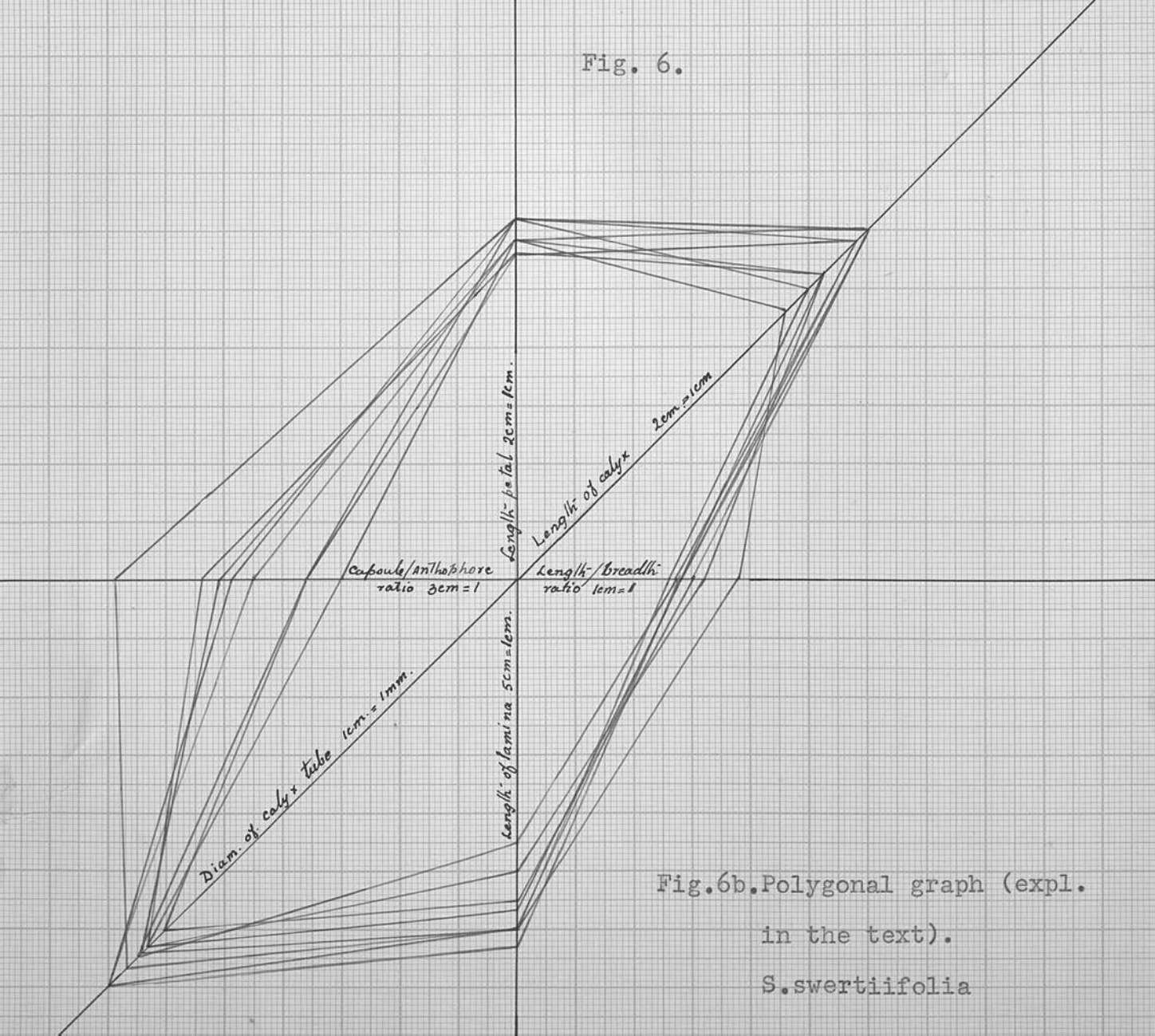


Fig.6b.Polygonal graph (expl. in the text).
S.swertiifolia

Fig. 6.

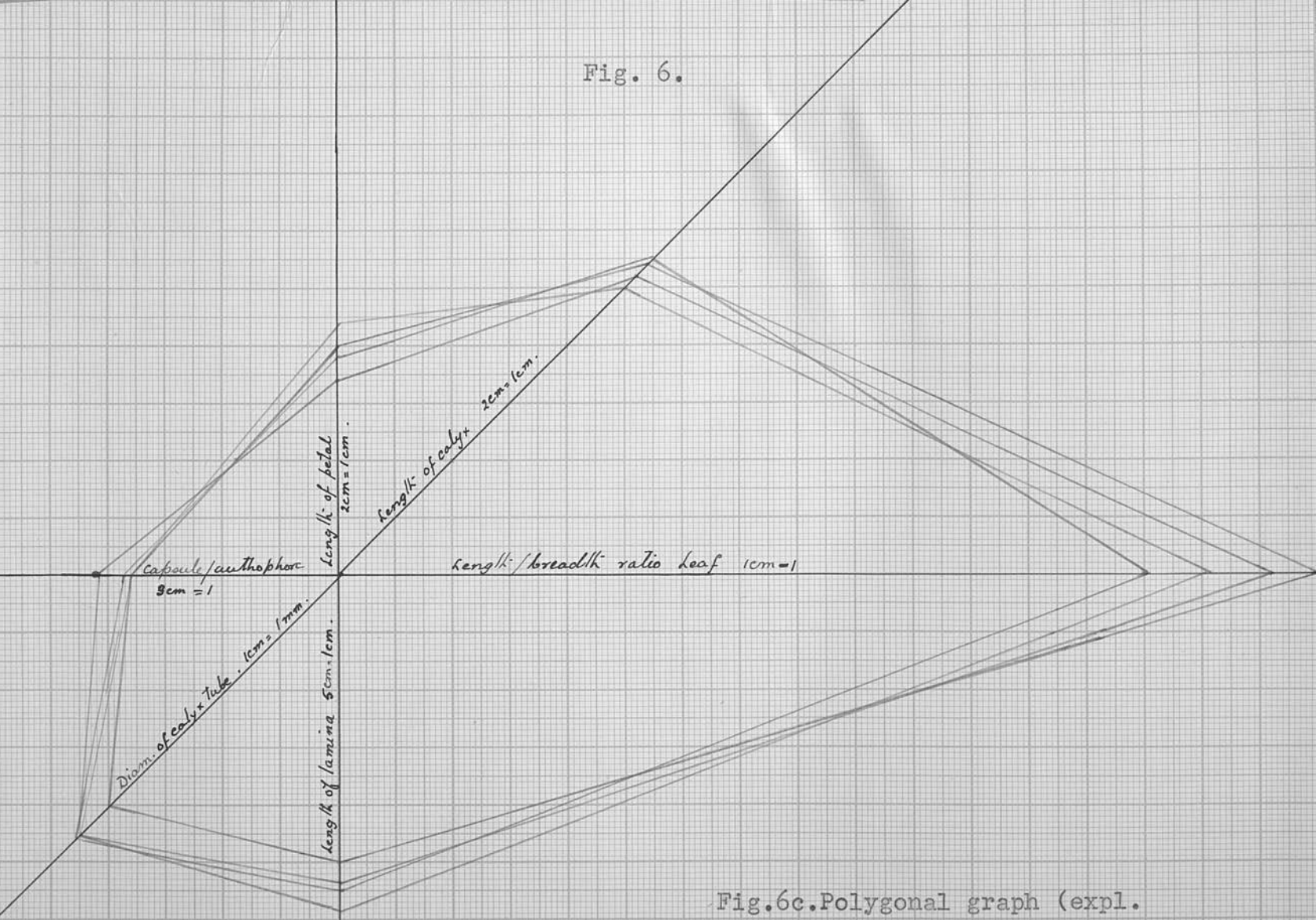


Fig.6c.Polygonal graph (expl. in the text).
S.makmeliana

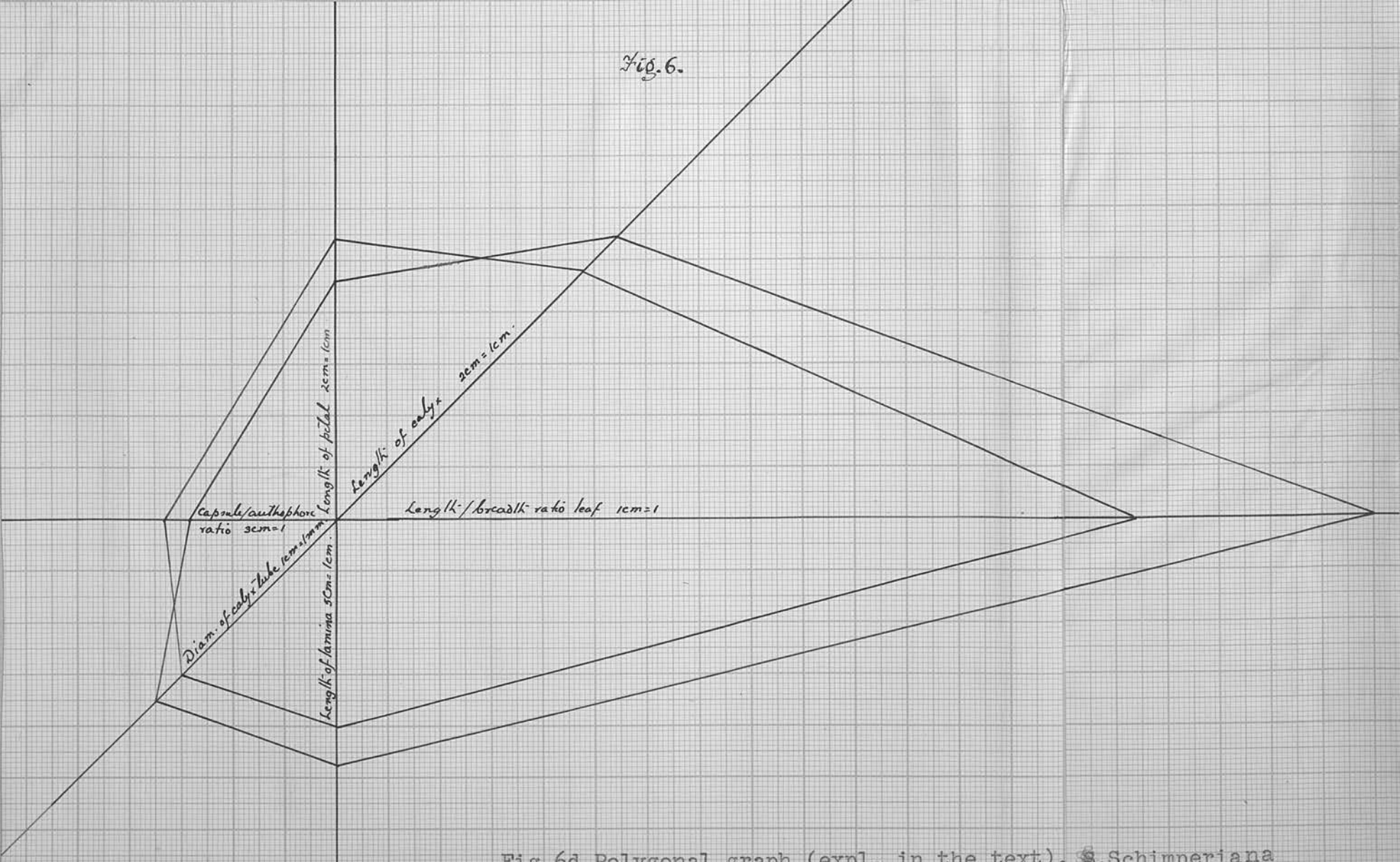


Fig.6d. Polygonal graph (expl. in the text). S.Schimperiana

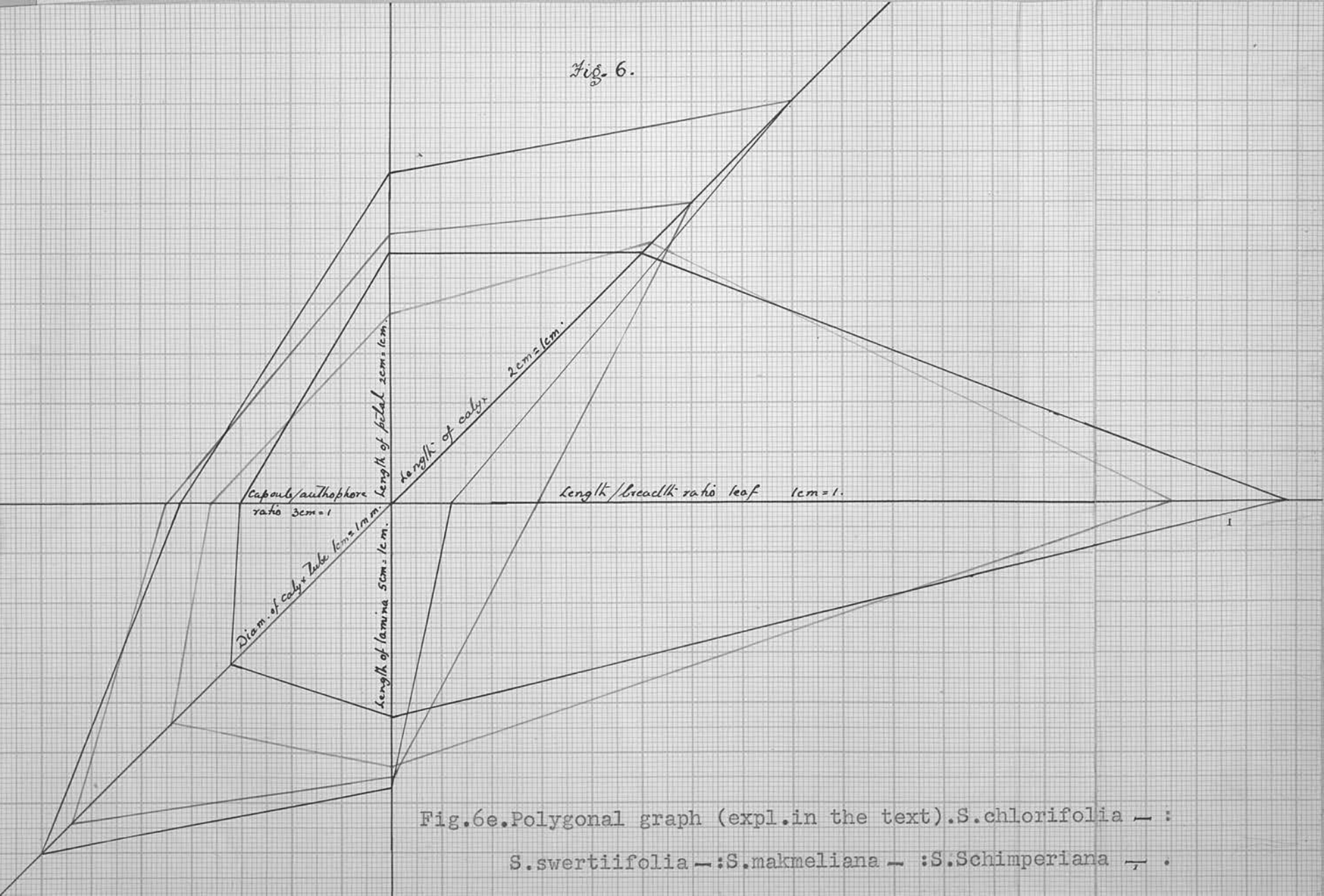
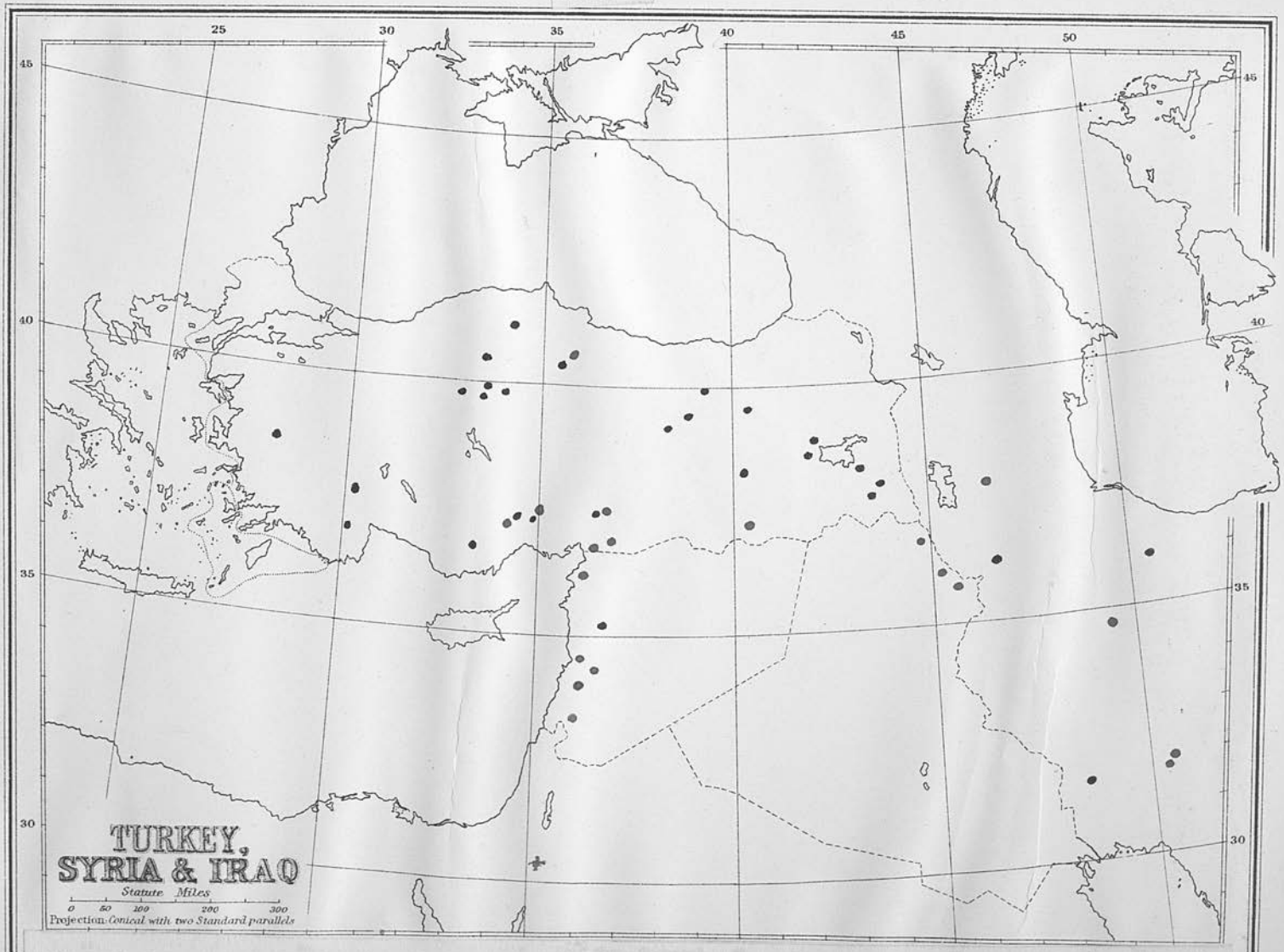


Fig.6e.Polygonal graph (expl.in the text).S.chlorifolia — :
S.swertiifolia —:S.makmeliana — :S.Schimperiana — .

MAP 2



Map 2.Distribution of Silene swertiifolia and its allied apecies

Sp. S.chlorifolia • Sp. S.swertiifolia • Sp.S.makmeliana •

Sp. S.Schimperiana +

The statistical data are obtained from the following variables=

i. Length & breadth ratio of the middle cauline leaves
ii. Length of calyx tube
iii. Diametre of the calyx tube
iv. Length of the petal(average for each flower)
v. Length of the lamina (do)
vi. Relative length of capsule & anthophore(average for each gathering)

These variables are plotted separately for each species (in different colours) [fig.6 a-d],and the means for each species are plotted in the fig.6e,these also being in same colour as those for each species.It will be seen that these taxa differ in all the characters considered,except for S.makmeliana and S.Schimperiana which nearly coincide in the length of the calyx tube.Thus these diagnoses clearly show that it will not be wise to treat S.chlorifolia,S.swertiifolia,S.makmeliana and S.Schimperiana as varieties of S.chlorifolia.

I have therefore assigned specific rank to them.

The distribution of these species together with their varieties has been shown in the accompaning map[Map 2].

27. S.sclerophylla Chowdhuri,sp.nov. Plate 2.;fig.7.

Habitu valde affinis S.swertiifoliae Boiss. sed foliis oblanceolatis,calycibus angustioribus,laminis petalorum roseorum

cuneatis minus bifidis,capsulis ovato-oblongis anthophoro brevioribus (haud longioribus) differt.

Herba perennis, 30.0- 45.0 cm. alta,glaberrima,glauca, basi suffrutescens.Caudex 2.5- 7.0 cm.longus,2.3-6.0 mm.latus, ligneus,ramosus,erectus vel ascendens.Caules floriferi erecti vel e basi arcuato-erecti,foliosi,teretes,pallide virides,inferne aliquantum violascentes,simplices vel in regione inflorescentiae dichotome vel cymosim ramosi,nodis plus minus incrassatis, internodiis mediis 2.7-4.5 cm.longis.Folia caudicalia conferta, parva,2.6-3.7 cm.longa,5.0-8.0 mm.lata,oblanceolata vel lineari-oblanceolata,sub anthesi emarcida,basibus persistentibus;folia caulina 3.4-5.6 cm.longa, 6.0-12.0 mm.lata,oblanceolata vel anguste oblanceolata saepius lanceolata,sursum gradatim crescentia, basi sensim in petiolum brevem attenuata,brevissime vaginato-connata ibique membranaceo-marginata,erecto-patentia,plus minus crassiuscula,subcoriacea,superiora reducta,omnia acuta,cartilagineo-marginata,serrulato-ciliata;costa mediana pallida subtus prominente.Inflorescentia pauciflora,cymosim vel dichotome paniculata ,ramis oppositis erecto-patentibus paucifloris. Bracteae 7.0-16.0 X 1.3-1.8 mm.,lineari-lanceolatae vel lineares, acutae;bracteolae anguste lineari-subulatae albo-marginatae. Pedicelli 0.8-3.6 cm.longi,erecti vel ascendenti-erecti.Flores hermaphroditi,centralis longe et laterales breviter pedicellati. Calyx 2.3- 2.85 cm.longus,3.5-4.0 mm.diametro,tubuloso-clavatus, coriaceus,10-nervius,(nervis extus haud prominentibus superne anastomosantibus),in fructu clavatus,basi annulo circulari pseudo-umbilicatus;dentes 2.8-3.3 X 2.3-2.8 mm., ovati,alternatim

Plate

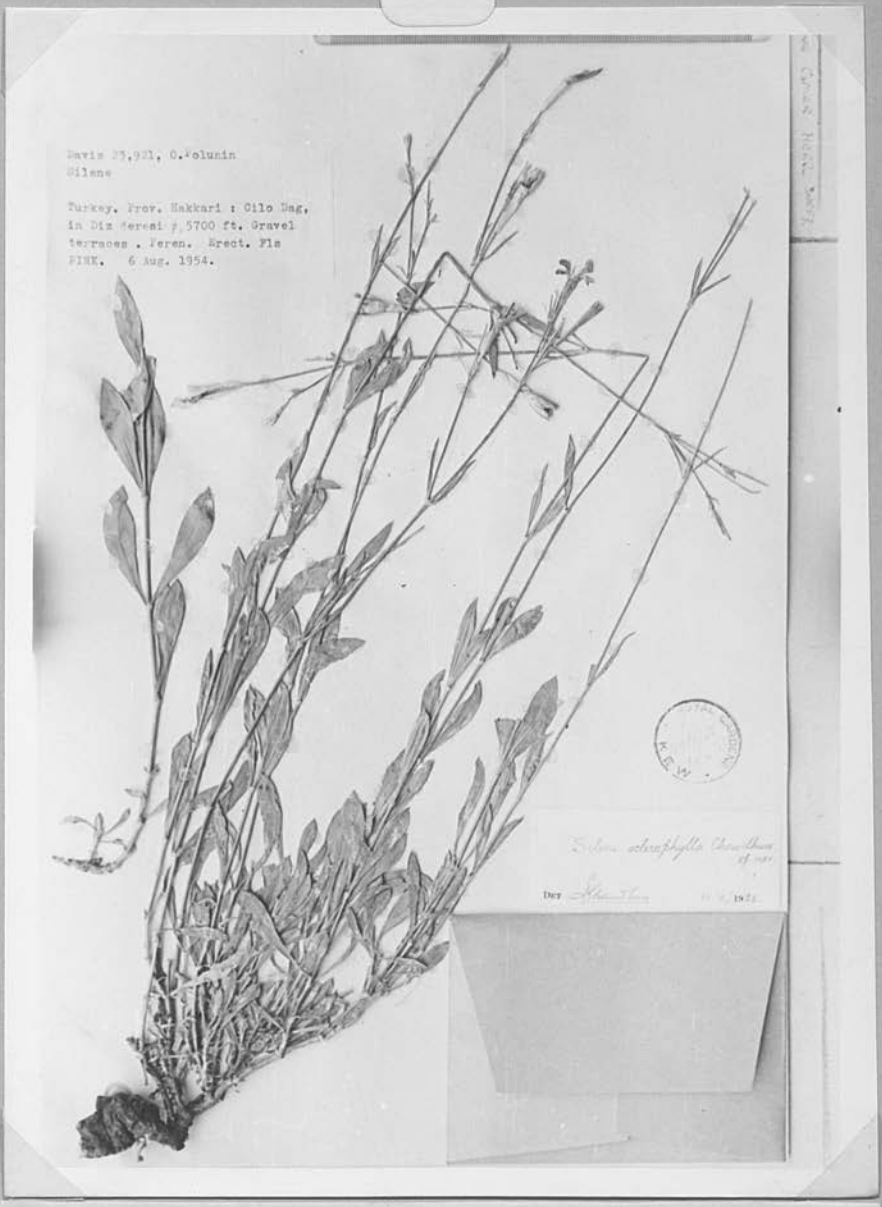


Plate 2-Silene sclerophylla Chowdhuri

Fig.7

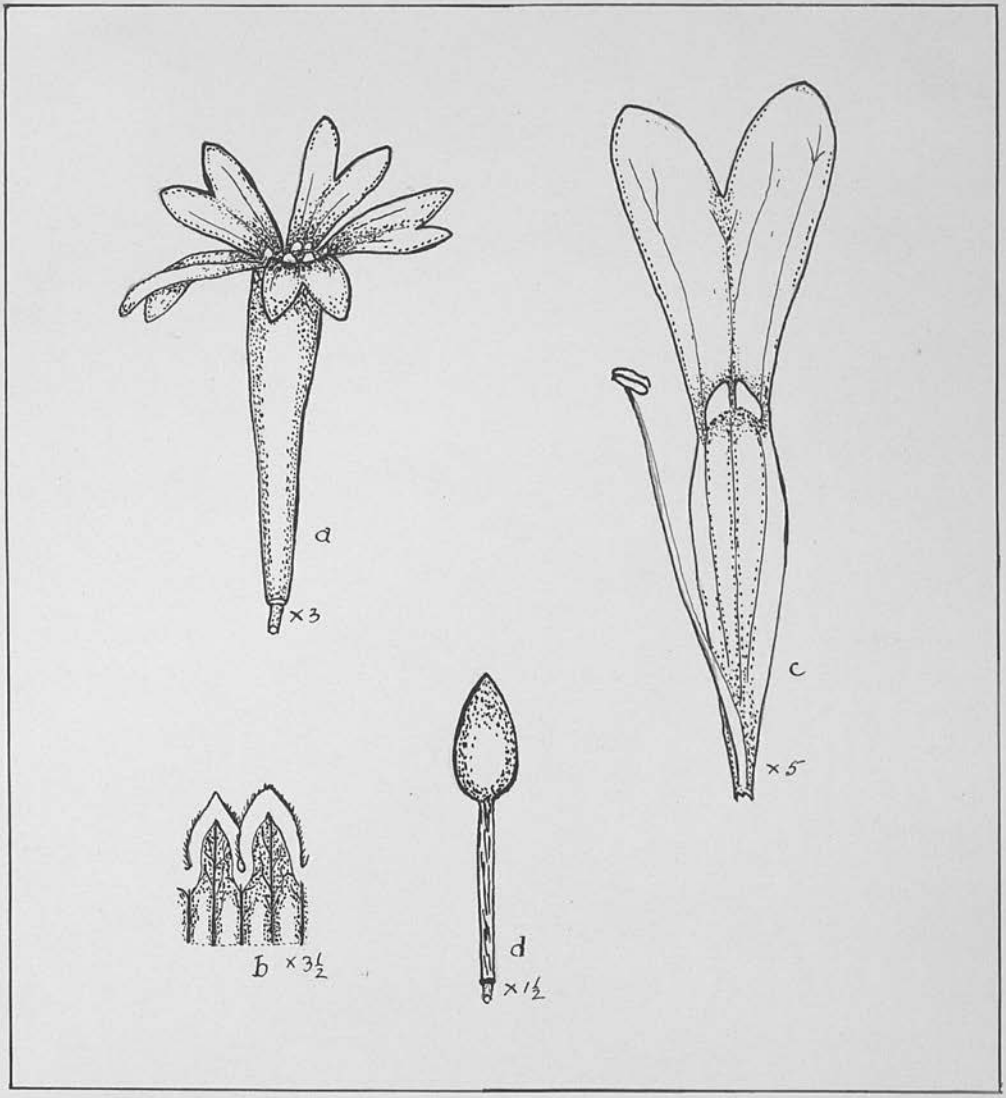


Fig.7.Silene sclerophylla:a-flower;b-calyx teeth;
c-petal ; d- capsule.

acuti et obtusi,albo-marginati,superne minute et sparse ciliolati. Petala 2.0-2.3 cm.longa,rosea;unguis 1.1-1.2 cm.longus,supra-medium dilatatus,glaber,exauriculatus;lamina 9.0-11.0 X 5.5-6.3 mm.,obovato-cuneata,usque ad 1/3 in lobos obtusos bipartita; ligulae binae e basi obliquae,ovatae,obtusae.Stamina exserta; filamenta 1.2-1.5 cm.longa,glabra.Styli tres,6.0-7.3 mm.longi, crassiusculi,inclusi.Anthophorus 1.7-1.85 cm.longus,glaber. Capsula 1.0-1.2 X 0.45-0.55 cm.,ovato-oblonga,anthophoro sesqui-brevior,calyce inclusa.Semina brunea,1.8-2.3 mm.longa,dorso canaliculata,faciebus plana striata.

TURKEY- Prov. Hakkari: Cilo dag in Dizderesi,1710m.,gravel terraces, flowers pink,6-8-1954, Davis 23921 O.Polunin[holo.K.; iso.E.]

28. S.sclerophylloides Chowdhuri,sp.nov. Plate 3.;fig.8.

Cum facie S.sclerophyllae Chowdhuri sed foliis angustioribus acuminatis,floribus unisexualibus,petalis virescenti-albidis ultra medium bipartitis differt.

Herba perennis,glabra,plus minus glauca,basi ramosa, suffrutescens,ut videtur dioica.Caudex 10.0 cm.longus,tenuis, ramosus,erectus vel ascendens. Caules 15.0-30.0 cm.alti,erecti, teretes,foliosi,pallide virescentes,simplices vel in regione inflorescentiae ramulosi,nodis plus minus incrassatis,internodiis mediis 1.8-3.5 cm.longis.Folia caulina numerosa,conspicua,

sursum gradatim increscentia,2.1-3.7 cm.longa,3.0-5.5 mm.lata, anguste lanceolata vel lineari-lanceolata,apice basique attenuata, sessilia,erecto-patentia,basi brevissime vaginato-connata ibique membranaceo-marginata,ciliata,superiora reducta,omnia acuminata, uninervia,serrulato-ciliata,costa mediana pallida subtus prominente; folia caudicalia parva,conferta,foliis caulinis similia,sub anthesi emarcida.Inflorescentia racemiformis pauciflora,ramis alternatis brevibus unifloris.Bracteae et bracteolae aequales,herbaceae, acuminatae vel subulatae,basi albo-marginatae sparse ciliolatae. Pedicelli 6.0-13.0 mm.longi,erecti,stricti.Flores breviter pedicellati,unisexuales.Calyx 2.75-2.9 cm.longus,4.0-5.0 mm. diametro,tubuloso-clavatus,coriaceus,glaber,10-nervius (nervis virescentibus vel purpurascentibus superne anastomosantibus), in fructu clavatus,infra capsulam leviter constrictus,basi annulo circulari pseudo-umbilicatus;dentes 2.5-3.0 X 2.3-2.5 mm., ovati, alternatim acuti et obtusi,albo-marginati et ciliolati.Petala 1.9-2.4 cm.longa,viridi-albescens;unguis 1.2-1.3 cm.longus,supra medium dilatatus exauriculatus glaber;lamina 7.0-11.0 X 4.5-5.3 mm., cuneata ultra medium bipartita,lobis plus minus divaricatis linearioblongis ad apicem obtusis vel rotundatis;ligulae binae,1.0-1.3mm. longae,oblongae,obtusae vel emarginatae.Stamina abortiva.Styli tres, 9.0-11.0 mm.longi,exserti,superne paullum dilatati pubescentes ad apicem recurvi.Anthophorus 1.6-1.8 cm.longus,glaber.Capsula 8.5-15.0 X 4.5-6.5 mm.,oblonga,anthophoro duplo vel triplo brevior,calyce inclusa.Semina brunea,0.8-1.3 mm.longa,plus minus compressa,dorso canaliculata,faciebus plana vel plus minus concava striata

TURKEY- Prov. Bitlis: Kambas dag above Hurmuz,1800m.,31-6-1954, Davis 23495, O.Polunin [holo.K.;iso.E.].

Plate 3

Plate 3-Silene sclerophylloides Chowdhuri

Fig.8

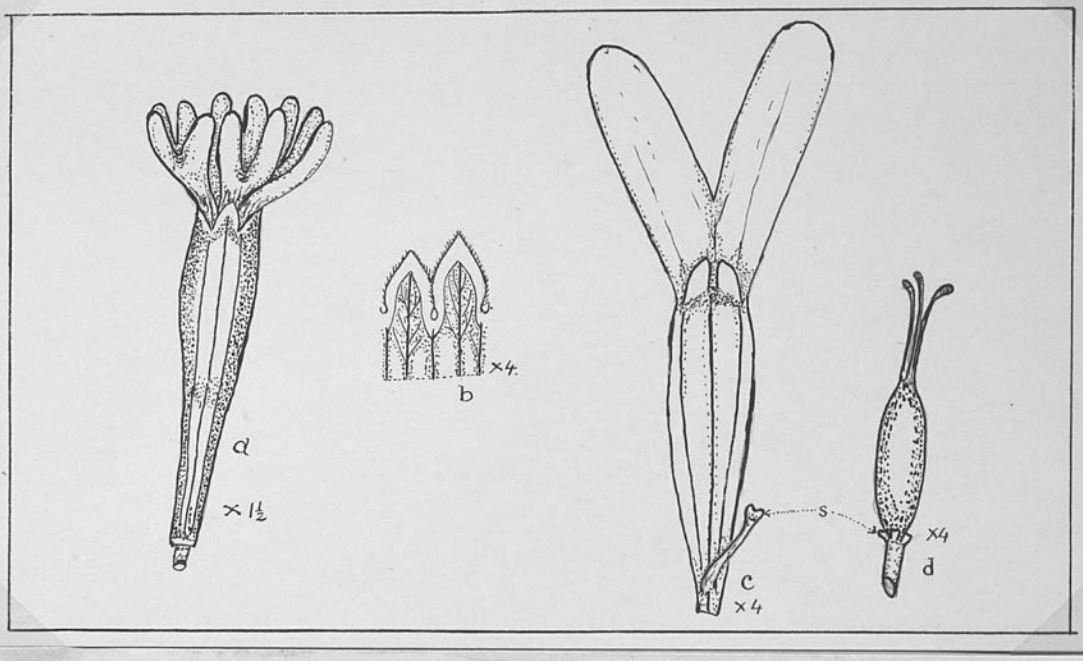


Fig.8.Silene sclerophylloides:a-flower; b-calyx teeth c-petal with a sterile stamen;d-capsule.

S.sclerophylloides, unlike other species of the section, bears unisexual flowers but is undoubtedly related to and probably derived from S.sclerophylla Chowdhuri. It resembles that species in floral characters, eg., shape of calyx, calyx teeth. But it differs from S.sclerophylla in the inflorescence which is raceme-like with a few alternate shortly peduncled flowers, shape of lamina and in the size of seeds.

29. S.makmeliana Boiss., Diagn. Pl. Nov. Or., Ser. 1. viii, 89 (1849); Boiss., Fl. Or., i, 641 (1867); Rohrb., Monogr. Sil., 178 (1868); Post, Fl. Syr. Pal. & Sinai, ed. 2. i, 186 (1932)- Bouloumoy, Fl. Lib. & Syr., t. 48, fig. 1 (1930).

Syn. S.makmeliana Boiss., Diagn. 1. viii, 89 (1849); non Boiss. & Buhse, Aufz. (1860).

S.Schimperiana var. latifolia Fenzl in Ky. Pl. Pers. austr, 620.

S.divaricata Ehrh., Herb, pro parte ex Rohrb., Monogr. Sil., 178 (1868); non Clem. (1806); non Sibth. & Sm. (1806); non Otth (1824).

S.libanotica Bornm., It. Syr., no. 189 (1897) ms.; non Boiss. (1849).

Perennial, 12.5-50.0 cm. tall. Root stout, vertical, woody, with a multicipital crown. Caudex 5.0-20.0 cm. long, 3.0-6.0 mm. wide, ascending, sometimes decumbent, becoming branched & suffruticose, with leaf scars and vegetative buds in old portion & young portion with bases of old leaves. Stem erect, often arcuate at the base, terete, purplish below, simple or sparingly branched above, glabrous and glaucescent; middle internodes 2.3-5.5 cm. long. Caudical & lower

cauline leaves rosulate,petiolate,2.3-4.7 cm.long,3.0-5.3 mm.wide, oblong-lanceolate,lanceolate or oblanceolate,acute,attenuated into petiole;other cauline leaves sessile,1.6-5.5 cm.long,1.5-3.5 mm. wide,linear-lanceolate to linear,sometimes lanceolate;all leaves acute,1-nerved,glabrous,with serrate-ciliate margin.Inflorescence a panicle of few flowers,cymules alternate,1-flowered,often inflorescence reduced .Bracts equal,linear.Pedicels 2.3-5.4 cm.long, erect.Calyx 2.15-2.7 cm.long,4.0-4.5 mm.diam.,cylindrical-clavate, glabrous,with 10 more or less obscure anastomosed nerves,in fruit clavate with the base narrowed below the capsule,base pseudo-umbilicate with an annular ring;teeth 2.3-3.3 X 2.0-3.0 mm., triangular or lanceolate acute alternating with ovate or obovate obtuse or retuse teeth,teeth with wide hyaline margin.Petal white , 1.6-2.0 cm.long;claw 7.0-9.0 mm.long,exserted,smooth,exauriculate; limb 9.0-11.0 X 4.0-6.0 mm., obcordate-cuneate,bipartite into obovate lobes;ligules two,minute,often representd by thickened outgrowths.Filaments exserted,smooth.Styles 3,exserted,hairy above. Anthophore 9.0-12.0 mm.long,smooth.Capsule 1.3-1.7 X 0.4-0.5 cm., oblong,as long as or somewhat longer than anthophore,slightly exserted.Seed brown,1.5-2.3 mm.long,with flat face and grooved back, granulate. Ch.

Syntype- In Libano ad radices cacuminis Makmel,hue quoque spectant specimina e monte Kuh Daena,Persiae australes No.626 S.Schimperiana var.latifolia Fenzl.

SYRIA- sine loco,a1822,Ehrh.;ibid.29-91860,Hook.& Hanbury;Rashegiats Mt.Hermon,yr.1863-4,Lowne .

LEBANON- Scherbin above Ihden,16-1800m.,1-7-1910,Borbm.11431;ibid. Bornm.11432;Sanin,17-1800m.,6-7-1897,Bornm 189;at Bischerre &

Cedretum,1740m.,21-7-1855,Ky.288.

IRAN- Kuh Daena,Ky.626.

Geogr. Endemic to the countries cited above.

Habitat- Alpine and subalpine;alt.16-1800m., Fl.-June & July.

30. S.libanotica Boiss.,Diagn.Pl.Nov.Or.,Ser.1.viii,89(1849);Boiss., Fl.Or.,i,642(1867);Rohrb.,Monogr.Sil.,181(1868)- Bouloumoy,Fl.Lib.& Syr.,t.48.fig.2 (1930).

Perennial,30.0-40.0 cm.tall.Root vertical,woody,with a multicipital crown.Caudices several from the crown,erect or ascending, becoming branched and suffruticose,old part naked,young part with bases of old leaves.Stem many,erect,often arcuate at the base,terete, glabrous,viscid above,usually simple below,sparingly branched above; nodes more or less swollen;middle internodes 2.7-6.0 cm.long. Caudical leaves rosulate,petiolate,2.6-4.3 cm.long,5.0-9.5 mm.wide, oblong- or lanceolate-spathulate,attenuated into petiole,base with hyaline ciliate margin;cauline leaves sessile,2.1-4.0 cm.long, 4.0-8.0 mm.wide,lanceolate,oblanceolate or linear-lanceolate;all leaves glabrous,1-nerved,obtuse to acute,with serrate-ciliate margin. Inflorescence a raceme-like panicle;cymules opposite,short,usually 1-flowered.Bracts and bracteoles equal.ovate-lanceolate,acute or acuminate,with hyaline margin.Pedicels 9.0-21.0mm.long,bent down at anthesis,erect in fruit.Flowers hermaphrodite,nodding.Calyx 1.6-1.9 cm.long,4.0-5.0mm.diam.,obconical-cylindrical or obconical-clavate,with 10 more or less obscue anastomosed nerves,in fruit clavate,base pseudo-umbilicate with an annular ring;teeth 2.5-3.9 X 2.0-3.0 mm.,ovate obtuse teeth alternate with triangular acute or

acuminate ones,teeth with wide hyaline margin.Petal greenish yellow, 1.3-1.5 cm.long;claw 7.5-8.3 mm.long,equalling calyx,smooth,auricles usually absent,seldom present,minute;limb 5.5-6.3 X 1.5-2.3 mm., cuneate,bipartite to the middle into linear lobes;ligules usually absent.Filaments smooth,exserted.Styles 3,exserted.Anthophore 6.0-8.0 mm.long,smooth.Capsule 9.0-11.0 X 4.0-5.0 mm.,oblong,1-2 times as long as anthophore,included.Seed brown,1.5-2.0 mm.long, with flat face and grooved back,striate.Ch.

Type- In altioribus Libani supra Cedros,July,1846,Boiss.[holo.G.]

LEBANON- Cedars,6-9-1898,Post.

Geogr. Lebanon&Palestine.

Habitat- On mountains. Fl.-Aug. & Sept.

S.libanotica is closely allied to S.makmeliana Boiss., but differs from the latter in the following diagnostics: more markedly branched and regular inflorescence,shorter pedicels,short but comparatively broader calyx,yellowish-green petal having a cuneate limb,and the more or less large & included capsule.Over & above these differences S.libanotica is set off from S.makmeliana by its nodding flowers.

31. S.Haradjianii Chowdhuri,sp.nov. Plate 4;fig. 9.

Affinis S.makmelianae Boiss. et S.Schimperianae Boiss.: ab ambobus dentibus calycis elongatis alternatim breviter et longe acuminatis,anthophoro puberulo,caulibus inferne pruinoso-scabridulis superne glabris viscidis;insuper a priore caulibus elongatis superne racemoso-paniculatis recedit;ab altera foliis

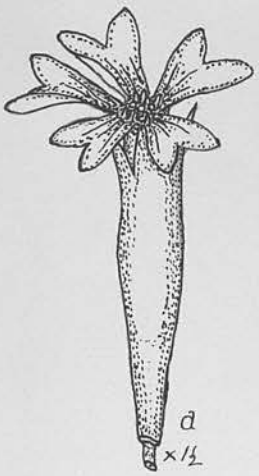
oblanceolatis distinguiter.

Herba perennis,30.0-80.0 cm.alta,ima basi suffrutescens. Caudex 3.0-8.0 mm.latus,brevis,simplex vel furcatus,erectus vel ascendenti-erectus,superne foliatus.Caules floriferi erecti vel arcuato-erecti,teretes,inferne simplices pruinoso-scabridi pallide violascentes,superne glabri viscidi racemoso-paniculati,ramis elongatis oppositis plus minus divaricatis,nodis plus minus incrassatis,internodiis mediis 2.3-4.7 cm.longis.Folia caudicalia numerosa,1.9-7.0 cm.longa,4.5-7.8 mm.lata,lanceolata vel oblanceolata, in petiolum gradatim attenuata,basi plus minus trinervia,anguste vaginato-connata ibique membranaceo-marginata,minute ciliolata,plus minus indurata,persistentia;folia caulina 2.3-8.5 cm.longa,5.0-12.0 mm.lata,plus minus crassiuscula,infima caudicalibus similia sensim increscentia,superiora lineari-lanceolata subsessilia basi attenuata, omnia acuta,plus minus fasciculata,pruinoso-scabrida,serrulato-ciliata.Inflorescentia laxe racemoso-paniculata,ramis primariis oppositis elongatis,cymis 1-3 floris.Bracteae subaequales,foliis caulinis conformes;bracteolae inaequales,lineares,basi trinervis, late membranaceo-marginatae ciliolatae.Pedicelli 1.9-3.7 cm.longi, erecti vel erecto-patentes.Flores hermaphroditi.Calyx 2.7-2.9 cm. longus,3.5-4.0 mm.diametro,cylindrico-clavatus,coriaceus,pallide rubro-suffusus,glaberrimus,10-nervius (nervis superne anastomosanti--bus),in fructu clavatus,infra capsulam constrictus,basi annulo circulari pseudo-umbilicatus;dentes 4.5-6.0 X 1.8-2.0 mm., lanceolati,alternatim breviter et longe acuminati,albo-marginati, minute ciliolati.Petala 2.5-3.1 cm longa,in sicco sordide purpurescentia;unguis 1.5-1.6 cm longus,exsertus,ad medium dilatatus,exauriculatus;lamina 1.0-1.5 X 0.5-0.63 cm.,cuneata

Plate

Plate 4-Silene Haradjianii Chowdhuri

Fig.9



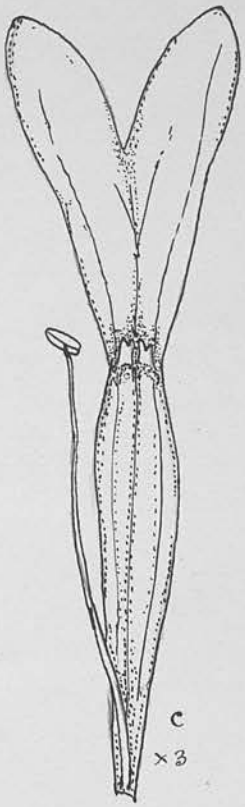


Fig.9.Silene Haradjianii:a-flower;b-calyx teeth;
c-petal;d- capsule

bipartita,lobis oblongo-ovatis obtusis;ligulae binae,0.3-0.5 mm. longae,lineares.Stamina exserta;filamenta glabra.Styli tres,1.4-1.7 cm.longi,superne paullum dilatati pubescentes.Anthophorus 1.0-1.3 cm.longus,brevissime subretrorsim puberulus.Capsula 1.1-1.35 X 0.45-0.53 cm.,oblonga,anthophorum aequans,calycem paulo superans. Semina brunea,1.3-1.5 mm.longa,plus minus compressa,dorso canaliculata,faciebus plana.

TURKEY- Mt.Amanus: Kusliji dag,1500-1950m.,Aug.1908,Haradjian 2482; Mt.Amanus,1200m.,Aug.1906,Haradjian 469 [holo;K.]

32. S.Schimperiana Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,31 (1842); Boiss.,Fl.Or.,i,641(1867);Post,Fl.Syr.Pal.& Sinai,ed.2.i,187(1932).

Syn. S.dianthoides Schimper,ms.;non Pers (1805).
S.Schimperiana Boiss.,Diagn. 1.i,31(1842);Hochst.
S.divaricata Ehrh.Herb.pro parte ;non Clem.(1806); non Sibth.& Sm.(1806);non Otth(1824).

Tall perennial with suffruticose base.Caudex short,sparingly branched,ascending or arcuate,covered with the bases of old leaves. Stem 60.0-109.0 cm.high,erect,seldom arcuate at the base,terete, leafy,usually branched,rarely simple,branches opposite,sometimes alternate,spreading or ascending,glabrous,glaucous,more or less viscid above;nodes more or less swollen;middle internodes 4.0-6.5 cm.long.Leaves monomorphic,linear-lanceolate or linear-spathulate or linear,sometimes narrowly lanceolate,acute,serrate-ciliate;caudical and lower cauline leaves 4.0-9.0 cm.long,3.5-7.0 mm.wide,petiolate,attenuate into petiole,base with hyaline margin

other cauline leaves sessile,3.0-8.7 cm.long, 3.0-7.0 mm.wide. Inflorescence a lax panicle with alternate 1-flowered cymules. Bracts equal,linear.Pedicels of terminal flowers 5.0-24.0 mm.long, and those of lateral ones 1.0-4.5 cm.long.Flowers hermaphrodite, erect.Calyx 2.4-2.7 cm.long,4.3-5.0 mm.diam.,cylindrical-clavate, glabrous,with 10 anastomosed nerves ,infruit clavate with constriction below the capsule,base pseudo-umbilicate with an annular ring;teeth 2.8-3.2 X 2.5-3.0 mm.,lanceolate acute alternating with ovate obtuse,teeth with hyaline ciliate margin. Petal 2.3 cm.long;claw 1.4 cm.long,exserted,smooth,exauriculate; limb 9.0 X 5.0 mm., cuneate,bifid into oblong-linear lobes;ligules two,1.0 mm.long,triangular ,acute.Filaments exserted,smooth. Anthophore 1.4-1.75 cm.long,smooth.Capsule 1.3-1.5 X 0.5-0.65 cm.,oblong,as long as anthophore,included.Seed brown,with flate face and grooved back,granulate.Ch .

Type- In Arabia petraea,Schimper Un.Itin.283 et 422
[holo.G.;iso.K'.,E'.,BM'.]

Geogr. Endemic.

Habitat- Rocky places. Fl.-April & March.

S.Schimperiana,in its leaf shape,approaches the members of the subsection Longiflorae ,but the large,conspicuous cauline leaves,more branched inflorescence and characters of the flowers favours its retaintion in the subsection Chlorifoliae and at the same time exhibits its close relationship with S.chlorifolia and its allies.S.Schimperiana stands out from this related group by the shape of the leaves,size of calyx and capsule,and shape of the petal limb.

SECTION 6 TUNICOIDEAE

33. S.tunicoides Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,34 (1842);Boiss., Fl.Or.,i,655(1867);Rohrb.,Monogr.Sil.,182(1868).

Perennial,9.0-18.5 cm.tall.Caudex slender,elongated, 5.3-20.5 cm.long,2.5-6.0 mm.wide,prostrate to semi-erect or arcuate,becoming branched and suffruticose,covered with leaf scars and bases of old leaves,often bearing vegetative buds on the old part.Stem slender,terete,leafy,erect,canescent-puberulent below, glabrous above especially in the region of inflorescence,branched; branches alternate,ascending,long.Leaves monomorphic,7.0-22.0 mm. long,0.3-0.5 mm.wide,subulate,strict,lower slightly recurved, fasciculate,serrate-scabrous,base with hyaline ciliate margin, apex acute.Inflorescence a panicle;cymules alternate or opposite, 1-3-flowered,sometimes entire inflorescence reduced to 1 flower. Bracts equal,ovate-lanceolate or lanceolate,acuminate,with narrow hyaline ciliate margin towards the base. Pedicels 5.0-17.0 mm.long, filiform,erect or ascending.Flowers hermaphrodite,erect,sometimes pistillate with aborted stamens.Calyx 4.2-4.5 mm.long,1.3-1.8mm. diam., ovate or obovate from a narrow truncate base,greenish, glabrous,subcoriaceous,with 10 greenish anastomosed nerves;teeth 1.0-1.5 X 0.7-1.0 mm., ovate,obtuse teeth alternating with acute ones,teeth with hyaline scarious or sparsely ciliate margin.Petal yellowish green,3.5-4.0 mm.long;claw 2.5-2.8 mm.long,equalling calyx,smooth,exauriculate;limb 1.0-1.3 X 0.7-1.0 mm.,oblong, entire with round apex;ligules absent.Filaments smooth,included. Styles 3,slightly exserted,hairy.Anthophore 1.0-2.5 mm.long,thick, smooth.Capsule 4.0-5.0 X 2.8-3.3 mm.,oblong,nearly 4 times as

long as anthophore,apex slightly exserted.Seed brown,0.8-1.3 mm.long,with flate striate face and grooved tuberculate back. Ch.

Type- Turkey-in Lyciae rupibus ad Marmoritza,Aucher 562 [holo.G.; iso. K'.,BM'.]

TURKEY- Prov.Isparta:dt.Sutcular (Isauria),Dedagol dag,between Selkose & Oruzgar yayla,1300m.,1-8-1949,Davis15926 ;Tekirova, 25-5-1950,Heilb. & Atilla . Goniik dersi,July 1949,Atilla .

Geogr. Endemic to Turkey.

Habitat- On rocks and cliff. Fl.-May-Aug.

S.tunicoides Boiss.is a somewhat anomalous species which shows affinities with more than one genus-Tunica & Gypsophila. S.tunicoides is essentially Silene-like in many characters,but the facies of the plant,shape & form of leaves,slender filiform branches and pedicels and small flowers which are very rare in this genus.However the presence of strong commissural nerves in the calyx (with usually alternating obtuse & acute teeth) and constant number of 3 styles are important characters that support its retention in Silene.S.tunicoides seems to have no near relative in the genus.Cytological investigation may throw some light on its affinities,since the genera have different basic numbers.

SECTION 7 CHLORANTHAE

The 9 species of this section are characterized by the woody perennial caudex elongated into a taproot,caudex simple or branched,the caudical leaves large,rosulate,lanceolate or spathulate-ovate,the cauline ones more or less reduced,the inflorescence usually long raceme-like,calyx subcoriaceous and sulcate between the nerves,white or yellowish petals which are bipartite & oblong,and stipitate capsule.

The species fall into 2 subsections on the basis of the presence or absence of ligules from the petal,length of the inflorescence,nature of calyx and shape of capsule.

Subsection Ecoronatae with 4 species has lanceolate-spathulate caudical leaves,long raceme-like many-flowered inflorescence,calyx oblong-clavate or clavate but not sulcate between the nerves and eligulate petal.While the subsection Coronatae ,comprising 5 species,is set off by the obovate- ,ovate- or lanceolate-spathulate caudical leaves,short raceme-like,few-flowered inflorescence,calyx usually clavate and sulcate,and ligulate petal.

Key to the Subsections and the Oriental species.

Petal eligulate;calyx oblong-clavate,sometimes clavate,not sulcate;inflorescence long,many-flowered:
.....7A.Subsection Ecoronatae

Petal ligulate;calyx clavate,more or less sulcate between the nerves;inflorescence short,few-flowered
.....7B.Subsection Coronatae

SUBSECTION 7A ECORONATAE

34. S.viscosa (Linn.)Pers.,Syn.,i,497(1805);Boiss.,Fl.Or.,i,582 (1867);Rohrb,Monogr.Sil.,205(1868)-Reichb.,Ic.Fl. Germ.Helv.,vi,t.291.fig.5099(1844);Hegi,Ill.Fl.Mitt-Eur.,iii,303 fig.577 (1910).

Syn. Cucubalus viscosus Linn.,Sp.Pl.1.414 (1753).
Lychnis viscosa Scop.,Fl.Carn.,ed.2.i,306(1772).
Cucubalus viscidus Krock.,Fl.Sil.,11.i,40 (1790).
Cucubalus Royeni Moench,Method.,Suppl.,303(1802).
Viscago viscosa (Linn.)Pers.,Syn.,i,497(1805);non Schleich.
Silene Royeni Pers.,Syn.,i,497(1805).
Viscago glutinosa Baumg.,Enum.Strip.Transs.,i,395(1816).
Silene quadriloba Turcz ex Kar.& Kir.in Bull.Soc.Nat.Mosc., xv,167(1842).
Melandrium viscosum Celak.in Lotos,Prag,xviii,118(1868).
Elisanthe viscosa Rupr.,Fl.Cauc.,200(1869).

Tall perennial,60.0-75.0 cm.high,tementulose and viscid, sparingly glandular throughout.Stem stout,erect,leafy,striate, simple,middle internodes 5.0-13.5 cm.long.Leaves monomorphic, gradually reduced upwards,7.0-15.0 cm.long,1.0-2.7 cm.wide,oblong-to linear-lanceolate,puberulent,margin undulate;caudical leaves rosulate,petiolate with lamina attenuated into it;cauline ones sessile.Inflorescence raceme-like;cymules short,opposite,3-5-flowered,lower one or two pairs more or less long,5-7-flowered. Bracts equal,ovate,acute to acuminate,ciliate.Pedicels 7.0-13.0 mm.long,erect.Flowers hermaphrodite,erect. Calyx 2.0-2.45 cm.long, 3.0-3.5 mm.diam., cylindrical-clavate,truncate-umbilicate,with 10 anastomosed nerves,glandular & villose,viscid,in fruit

clavate;teeth 3.5-4.3 X 1.3-1.5 mm.,lanceolate obtuse with hyaline ciliate margin.Petal white,3.0-3.5 cm.long;claw 2.0-2.3 cm.long, exserted,exauriculate,ciliate;limb 1.0-1.2 X 0.65-0.75 cm., cuneate,bipartite into oblong-obovate lobes;ligules absent. Filaments exserted,smooth or pilose. Styles 3, exserted,minutely hairy.Anthophore 3.5-4.3 mm.long,stout,hairy.Capsule 1.2-1.43X 0.35-0.43 cm.,oblong,3-5 times as long as anthophore,included. Seed dark brown,0.5-0.8 mm.long,with flat face and grooved back,granulate.Ch.

Linnaean specimen - in Eur. australiori et Oriente.
TURKEY- Armenia,sine loco. Calv. & Zohrab.
IRAN- at the foot of Mt.Demavent,Ky. 384.

Geogr. Bohemia,Hungaria,Siberia,Greece,Caucasus,Turkey,Iran & India.
Habitat- Gravelly places & on mountains. Fl.- July.

SUBSECTION 7B CORONATAE

35.S.lycaonica Chowdhuri,sp.nov. Plate 5;fig.10.

Affinis S.radicosae Boiss.et Heldr.[incl.S.oligantha Boiss.et Heldr.] sed habitu basi valde compacto,indumento parcissimo pruinoso,foliis caulinis minutissimis linearibus acuminatis manifeste trinervis,calyce fructifero tubuloso-clavato dentibus ovatis obtusis,filamentis glabris,capsula ovata anthophorum aequantibus differt.

Herba perennis,caespitosa,20.0-25.0 cm.alta.Radix lignea,recta,elongata,multiceps.Caudex 3.0-6.5 cm.longus,3.0-6.0 mm.latus,ramosus,foliosus.Caules floriferi tenues,erecti,teretes,

paucinodati,virides vel pallide purpurascentes,simplices vel superne breviter 1-3-ramosi,ut folia inferne pruinoso-scabridi, superne glabri et viscidi,nodis plus minus incrassatis,internodiis mediis 6.0-8.5 cm.lonis.Folia caudicalia numerosa,rosularia, crassiuscula,2.3-4.8 cm.longa,3.5-8.0 mm.lata,obovata,lanceolata vel oblanceolata rarius lineari-lanceolata,in petiolum longe attenuata,basi brevissime vaginato-connata ibique membranaceo-marginata,ciliolata,marcescentia,ad apicem obtusa,saepius acuta, costa mediana subtus prominente;folia caulina pauca,remota,reducta, bracteiformia,lineari-lanceolata vel linearia,acuminata,sessilia, obscure trinervia,tota longitudine albo-marginata,ciliolata . Bracteae et bracteolae subulato-lanceolatae,membranaceo-marginatae, ciliolatae. Pedicelli 1.2-2.3 cm.longi,tenues.Flores hermaphroditi in racemum 2-5 (7)-florum dispositi vel raro ad florem solitarium reducti.Calyx 1.4-1.6 cm.longus,3.0-3.5 mm. diametro,tubuloso-clavatus,subcoriaceus,glaberrimus,inter nervos subsulcatus,in fructu clavatus,basi truncato-umbilicatus, nervis 10 violascentibus medianis ad apicem latis,commissuralibus superne in venulas plures abeuntibus;dentes 1.5-2.3 X 1.8-2.0 mm., ovati,obtusi,fere emarginati,late membranaceo-marginati,ciliolati. Petala 1.7-1.9 cm.longa,in sicco brunescentia;unguis 9.5-11.0 mm. longus,ad medium dilatatus,exauriculatus,glaber;lamina 7.5-8.0 X 3.5-4.3 mm.,cuneata,ultra medium bipartita,lobis obovato-oblongis vel oblongis;ligulae binae,1.3-1.5 mm.longae,lanceolatae,acutae. Stamina exserta;filamenta 11.0-13.0 mm.longa,glabra.Styli tres, 7.0-9.0 mm.longi,exserti,superne minute pubescentes,ad apicem recurvi.

Anthophorus 6.0-7.3 mm. longus,glaberrimus, Capsula 7.0-8.3 X 4.0-4.3 mm., ovata,anthophorum aequans,calyce inclusa.Semina brunea,1.3-1.5 mm. longa,dorso canaliculata,faciebus plana, tuberculata.

Turkey - Prov. Konya : between Sanjuk Yaylâ & Uch Pinar (south of Bozkir) ; 2000m.,2-9-1947,Davis 14586 [holo. K.]

Plate 5

Plate 5-Silene lycaonica Chowdhuri.

SECTION 10 OTITEAE

The 8 species comprising this section consist of perennial plants. In addition to large, rosulate basal leaves, the group as a whole is characterized by small, usually dioecious flowers, paniculate inflorescence with clusters of flowers at the nodes forming a pseudo-verticellaster; the internodes between the two verticellasters are usually long, but in S.ventricosa, S.Roemeri & S.Sendtneri become short or nearly absent, so that the flowers are brought together at the apex of stem and in the most extreme case are grouped into a globose, head-like inflorescence. This last mention condition is usually found in S.capitellata & S.Otites var.umbellata . The petal is entire, seldom more or less emarginate, with smooth or ciliate claw. The calyx is obconical or campanulate, & the capsules are subsessile.

Key to the Oriental species.

Flowers unisexual, dioecious, pedicellate, in pseudo-verticellaster; limb linear-spathulate; claw smooth; plants tall with branched stem .....36. S.Otites

Flowers hermaphrodite, subsessile, in a capitate cyme; limb rhomboidal-elliptical; claw ciliate; plants of low stature with simple stem .....37. S.capitellata

36. S.Otites (Linn.) Wibel, Prodr. Fl. Werthem., 241 (1799).

A tall perennial, 20.0-90.0 cm. high. Root columnar or

fusiform,prolong into a taproot,with a simple or divided multicipital crown.Caudex 2.3-7.0 cm.long,3.5-12.0 mm.wide,more or less thick,erect to ascending,branched,woody,usually covered with brown bases of old leaves.Stem erect,terete,simple or branched;branches ascending or spreading,shorter than main axis, usually puberulent below with white short,sometimes long,straight or crisp hairs,glabrous and viscid above;nodes more or less swollen and those in the region of inflorescence usually hairy; middle internodes 4,3-9.0 cm.long.Caudical & lower cauline leaves rosulate,petiolate,1.5-8.5 cm.long,spathulate-lanceolate, attenuated into petiole,base with hyaline ciliate margin,apex obtuse,mucronate or acute;middle cauline leaves like the caudical ones ,upper ones remote,sessile,linear-lanceolate,seldom linear, acute or obtuse;all leaves densely puberulent,1-nerved,sometimes with undulate margin, often more or less fasciculate.Inflorescence of numerous small flowers in a long narrow panicle,interrupted below,the opposite pairs of short cymules simulating pseudo-verticellaster.Bracts and bracteoles equal,ovate-lanceolate,with hyaline ciliate margin,scabrous or glabrous.Pedicels 5.0-7.0 mm. long,erect or spreading,filiform,glabrous.Flowers dioecious often polygamous.Calyx 3.5-6.0 mm.long,2.5-3.5 mm.diam.,greenish, obconical or narrowly campanulate,glabrous,seldom puberulent,with 10 faint simple or sparingly anastomosed nerves,in fruit ovate; teeth 0.5-1.3 X 0.5-1.0 mm.,ovate,obtuse,often round with hyaline ciliate margin.Petal pale yellowish green ,4.0-6.6 mm.long;claw 2.5-3.6 mm.long,included,expanded,smooth or ciliate,exauriculate; limb 1.5-3.6 mm.long,linear-spathulate,entire,seldom more or less emarginate,eligulate.Filaments exserted,smooth.Styles 3(2-5)

exserted,hairy.Anthophore 1.0-1.5 mm.long,thick,smooth.Capsule 4.0-7.0 X 3.0-4.5 mm.,ovoid,subsessile or sessile,somewhat exceeding calyx. Seed 0.7-1.0 mm.long,reniform,with flat face & grooved back,finely rugose.Hs.or Ch.

Key to the subspecies and varieties (for Orient only).

Rachis of the inflorescence usually simple,rarely lower 1 or 2 nodes with lateral branches;verticellasters more or less compact; calyx 3.5-4.0 mm.long;claw smooth or ciliate;capsule 2.0-4.5 mm. long;seed 0.8-1.0 mm.long,granulate
.....i.subsp. Otites

Rachis branched,verticellasters loose;calyx 5.0-6.0 mm.long; claw smooth;capsule 5.0-7.0 mm.long;seed 1.0-1.8 mm.long, tuberculate
.....ii.subsp.densiflora

Calyx glabrous;capsule 5.0-6.5 mm.long
..... a.var.densiflora

Calyx hirsute;capsule 6.3-7.0 mm.long
..... b.var.trichocalycina

i. subsp. Otites .Smith,Fl.Brit.,ii,469(1800);Boiss.,Fl.Or.,i,606 (1867);Rohrb.,Monogr.Sil.,199(1868)-Reichb.,Ic. Fl.Germ.Helv.,vi,t.289.fig.5094 (1844); Sower.,Engl.Bot.,ii,206(1885);Moss,Cambr.Brit.Fl., iii,t.78(1920).

Syn. Cucubalus Otites Linn.,Sp.Pl.1.415(1753).
Lychnis Otites Scop.,Fl.Carn.,ed.2.i,305(1772).

Cucubalus parviflorus Lam.,Fl.Franc.,iii,26(1778);
non Ehrh. (1792).
Cucubalus dioicus & hermaphroditicus Gilib.,Fl.Lithuan.,
ii,167(1781).
Viscago polygama Stokes,Bot.Mat.Med.,ii,533(1812).
Viscago Otites Hornem.,Hort.Hafn.,411(1813).
Silene Otites var.calcicola Schur,Enum.Transs.,103(1866).
Silene Otites a genuina Rohrb.,Monogr.Sil.,200(1868).
Silene Otites subsp. euotites Graebn.,Syn.Mittel.-Eur.
Fl.,v.ii,192(1929).

Stem erect,usually simple,sometimes sparingly branched, densely puberulent with crisp hairs,becoming glabrous above. Caudical leaves obovate-lanceolate or oblanceolate-spathulate,or oblong-obovate;cauline leaves remote,linear-lanceolate or linear. Inflorescence a panicle of pseudo-verticellaster;axis usually simple sometimes lower one or two nodes developing lateral branches.Pedicels short.Calyx 3.5-4.0 mm.long.Petal 4.0-5.6 mm. long;claw smooth or ciliate .Capsule 2.0-4.5 mm.long.Seed 0.81.0 mm.long,granulate.

Linnaean specimen - In Siesia,Austria,Gallia,Sibiria [L'.]

TURKEY- Prov.Erzerum:Erzerum,Zohrab 156; Prov.Ankara :Chankaya, nr.Ankara,1000m.,15-5-1926,Lindsay 50 .

IRAN- Mt.Demawend,21-6-1843,Ky.355.

ii.subsp. densiflora (Urv.) Graebn.,Syn.Mittel-Eur.Fl.,v.ii,197 (1929)-Javorka & Csapody,Ic.Fl.Hung., 143.fig.1145(1930).

Syn. S.densiflora Urv.in Mem.Soc.Linn.Paris,i,303(1822).

S.Otites var.densiflora Otth in DC.,Prodr.,i,369 (1824).

S.exaltata Friv.in Flora,xviii,333(1835).

S.macroclada Boiss.,Diagn.Pl.Nov.Or.,Ser.1,viii,84(1849).

S.densiflora b.macroclada Boiss.,Fl.Or.,i,608(1867).

S.pedicellata Boiss.in Bourg.Pl.Lyc.Exs,exBoiss., Ic.

S.densiflora var.stenophylla Boiss.,Fl.Or.,i,608(1867).

S.macedonica Form in D.B.M.,ix,68(1891).

S.Otites var.macedonica Form in D.B.M.,ix,68(1891).

S.densiflora var.exaltata Gurke,Pl.Eur.,ii,414(1899).

S.chersonensis Kleop.in Bull.Jard.Bot.Kieff.,ix,9(1929).

Stem erect,tall,branched above,branches long,ascending, valvety with white crisp hairs,usually glabrous above.Caudical leaves obovate- or oblong-lanceolate;cauline leaves more or less reduced,lanceolate to linear-lanceolate,often fasciculate,margin sometimes undulate;lower leaves villose-puberulent.Inflorescence a panicle of pseudo-verticellaster.Pedicels longer than calyx.Calyx 5.0-6.0 mm.long.Petal 5.0-6.6 mm.long;claw smooth.Capsule 5.0-7.0 mm.long.Seed 1.0-1.8mm. long.

a. var. densiflora.

plants with adpressed hairs.Leaves obovate- to oblong-lanceolate ,sometimes linear-lanceolate,margin undulate.Calyx glabrous.Capsule 5.0-6.5 mm.long.

TURKEY- Prov.Ankara:Berysteppe,10-6-1932,Kotte ;Weinberge, 27-6-1932,Kotte;Hacikadun valley nr.Kecioren,11-6-1952,Davis 18736. Prov.Antalya:Antalya,Karakuya nr.Dinar,5-7-1949,Davis 15007; Karakuya,Sept.1950,Heilb.& Atilla; Elmali at Yemichem,9-7-1860, Bourg.68 .Prov. Denizli:Acipayam,14-7-1947,Davis 13453. Prov. Mersin :Gulnar,Kuzeyi,7-6-1950,Atilla . Cilician Taurus, Bozanti,a.1896,Siehe 393; Tel Oluk,1600m., June 1910,Siehe 382 Prov. Seyhan:Adana,Buruak,7-7-1937,R.F.161.

b. var. trichocalycina Boiss.,Fl.Or.,i,608(1867).

Syn. S.trichocalycina Bornm.in Fedde,Rep.Sp.Nov.Reg., lxxxix 108(1936).

Leaves obovate- to oblong-lanceolate,sometimes linear-lanceolate,fasciculate,acute.Calyx hirsute.Capsule 6.3-7.0 mm. long.

Type- In Cappadocia ad Caesaream Bal. [holo.G.]

TURKEY- Prov. Kayseri/ Nigde: Between Nevschir & Urgup,1200-1300m.,22-6-1952,Davis 19151.

Geogr.(of sp.) Spain,Italy,Hungary,Rumania,Bulgaria,Greece, Siberia,Turkey,Caucasus & Iran.

Habitat (of sp.) Steppe ;alt. 1200-1300m. Fl.- May-July.

37. S.capitellata Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,25 (1842); Boiss.,Fl.Or.,i,608 (1867);Rohrb.,Monogr.Sil., 199 (1868).

Syn. S.olympica Ky.,It.Cil.Kurd.,148 ex Rohrb. I.c.; non Boiss. (1842).

Caespitose perennial,5.9-34.0 cm.tall.Root woody, vertical,with a multicipital crown.Caudex 3.0-9.7 cm.long,2.5-5.0 mm.wide,decumbent to erect,branched,with the bases of old petioles and adventitious roots.Stem erect,terete,simple,greenish, puberulent below,glabrous above;middle internodes 1.7-8.2 cm. long.Caudical and lower cauline leaves rosulate,petiolate, 2.1-5.6 cm.long, 2.0-6.5 mm.wide,lanceolate-or oblanceolate- or linear-spathulate,attenuated into petiole,base with hyaline ciliate margin,apex obtuse or acute or nearly so,puberulent;

other cauline leaves sessile,1.5-4.1 cm.long,2.0-5.5 mm.wide, linear-lanceolate to linear,tapering at the base,3-nerved towards the base;all leaves obtuse,sometimes acute or nearly so,puberulent, seldom more or less hirsute.Inflorescence a capitate cyme;very rarely main axis becomes slightly elongated bearing flowers laterally.Bracts equal ovate-lanceolate;bracteoles ovate,both with wide hyaline and finely ciliate margin,scabrous or smooth. Pedicels 1.0-1.5 mm.long.Flowers hermaphrodite,erect.Calyx 5.0-6.4 X 2.3-2.8 mm.,campanulate,with 10 simple or sparingly anastomosed nerves,glabrous,sometimes scabrous or more or less puberulent at the nerves;teeth 1.9-2.3 X 1.8-2.3 mm.,ovate,obtuse or round with wide hyaline ciliate margin.Petal white,6.5-8.0 mm.long;claw 3.7-4.5 mm.long,included,exauriculate,ciliate; limb 2.8-3.5 X1.8-2.3 mm.,rhomboidal-elliptical or obovate,entire, rarely slightly emarginate,eligulate.Filaments smooth,exserted. Styles 3,exserted,smooth.Anthophore 1.5-1.8 mm.long,smooth. Capsule 4.5-5.3 X 2.8-3.0 mm.,ovoid,3 times as long as anthophore, included.Seed brown,0.5-1.0 mm.long,with flat face and grooved back.Hs.

Type- Turkey-in Armenia,Aucher 433 & 4271[holo.G.;iso.K'.BM'.]

TURKEY- Prov.Erzerum:between Erzerum & Ispir,6-7000m.,June,1853, Huet;Erzerum,Zohrab 105; ibid. Zohrab 106.Prov.Erzincan: Kemaliye,Yokardi dag,6-6-1890,Sint. 2496;Kemaliye,Hocadur dag14-5-1890,Sint2297. Armenia,sine loco. Calv.& Zohrab; Kuru dag,Zeylan,1590m.,10-5-1934,Balls 1027 ; Ak dag,8-6-1834, Montb.. Kurdistan,sine loco. a.1840,Strang.. Prov.Kayseri: Akoluk yayla on Bakir dag,2400m.,29-6-1952,Davis19342 .Prov. Bitlis:Nemrut dag,2280m.,3-7-1954,Davis 23553. Cilician Kurdistan in Cedreto,Mt.Tschosch dag,1800m.,23-5-1859,Ky. 148. Pisidia :Mt.Davros,May,1845,Heldr.

IRAN- Delidag,July 1893,Bornm.3286.

Geogr.Turkey,Iran, and Caucasus.

Habitat- Alpine ;alt.-1590-7000m..Fl.-May-July .

Although,S.capitellata Boiss. is obviously related to S.Roemeri Friv. and S.Sendtneri Boiss.,it is distinct from the both in its hermaphrodite flowers,and entire & ciliate petal.The condensed capitate cyme is generally a characteristic of more advance species,although the flowers are ~~are~~ here hermaphrodite. In habit and inflorescence S.capitellata shows some resemblance to S.olympica Boiss.,with which it was kept in the section Capitellatae by Rohrbach , it differs markedly from the latter species in smooth filaments and entire eligulate petal.

SECTION 11 HOLOPETALAE

The 5 species comprising this section are puberulent,of tall stature,with short woody simple or forked caudex,with slender stem, with fasciculate leaves,usually unisexual flowers in two different plants.The flowers are borne in a pseudo-verticellaster inflorescence and are provided with tubular-clavate calyx which becomes inflated and ovate in fruit.The petal is usually smooth,eligulate and with entire limb.

On the basis of leaf shape,nature of stem,and presence or absence of ligules from the petal and in particular to absence of stamens and carpels from the flowers, the species fall into 2 subsections.

Subsection Sibiricae contains 4 species which are dioecious.The stem is simple and bears linear-oblong leaves and petals are usually white and eligulate.

Subsection Ligulatae contains only one species and is characterized by ovate-lanceolate or lanceolate leaves that are broad,bisexual flowers with pink and ligulate petal.The stem is usually branched and the branches are long and slender.

Key to the subsection.

Leaves linear-oblong or linear;flowers dioecious;petal white,eligulate;claw smooth
.....11A.Subsection Sibiricae

Leaves ovate-lanceolate or lanceolate;flowers hermaphrodite; petal pink,ligulate;claw ciliate
.....11B.Subsection Ligulatae

SUBSECTION 11B. LIGULATAE

38. S.confertiflora Chowdhuri,sp.nov. Plate 6;fig.11.

Affinis S. sibiricae (Linn.) Pers. et S.holopetalae

Bunge sed caulibus longioribus ,indumento multo densiore, foliis caulinis lanceolatis vel oblongo-lanceolatis vel ovato-lanceolatis,ramis inflorescentiae glaberrimis viscidis,floribus hermaphroditis,dentibus calycis alternatim acutis et obtusis, petalis roseis coronatis unguibus paullum dilatatis ciliolatis differt.

Herba perennis,60.0-130.0 cm.alta,basi lignosa.Radix elongata,verticalis,lignea,in caudicem abrupte dilatata. Caudices breves,foliosi,simplices vel rarius 1-2 furcati,erecti. Caules floriferi erecti,teretes,foliosi,inferne simplices vel paullum ramosi,ad medium vel supra sparse ramosi,pallide virescentes,inferne retrorse pubescentes,interdum pallide viridi-purpurascentes,superne viscido-glabrescentes,nodis manifeste incrassatis,internodiis mediis 4.2-7.5 cm.longis.Folia caudicalia rosularia,2.5-4.6 cm.longa,5.0-9.0 mm.lata,lanceolata vel oblanceolata,in petiolum gradatim attenuata,basi brevissime vaginato-connata ibique membranaceo-marginata,ciliolata, marcescentia;folia caulina inferiora 3.7-6.3 cm.longa,8.0-14.0 mm.lata,caudicalibus similia sed breviter petiolata,gradatim sursum increscentia,basi membranaceo-dilatata,superiora sessilia, linrari-lanceolata,in axillis ramulos steriles vel fasciculos foliosis emittentia,foliis ramulorum sterilium angustioribus lanceolatis vel lineari-lanceolatis vel linearibus,omnia acuta, basi plus minus trinervia,hirtello-scabridula,in sicco pallide purpureo-violascentia.Inflorescentia paniculata,ramis gracilioribus, viscidis.Bracteae infimae lineari-lanceolatae,superiores lineares, basi trinerves,puberulae,anguste membranaceo-marginatae,ciliolatae.

Pedicelli 6.0-14.0 mm.longi,filiformes,puberuli,basi prophyllis binis praediti.Flores hermaphroditi,in ramos remote verticellastriferos dispositi.Calyx 6.5-7.5 mm.longus,3.3-4.0 mm.diametro, clavatus,plus minus ampliatus,puberulus,nervis 10 virescentibus et anastomosantibus minutus,in fructu ovatus,infra capsulam constrictus,basi truncatus;dentes inaequales,2.0-2.8 X 1.5-2.0 mm., alternatim triangulares acuti et ovati obtusi,late mambranaceo-marginati ciliolati.Petala 6.5-7.3 mm.longa,purpurea; unguis 3.5-4.5 mm.longus,supra medium dilatatus,ciliolatus; lamina 3.0-3.5 X 1.0-1.3 mm.,spathulato-elliptica,integra;ligulae binae,0.3-0.5 mm.longae,lineares,acutae.Filamenta 3.8-4.3 mm. longa,glabra,inclusa.Styli tres,3.5- 4.0 mm.longi,exserti, puberuli.Anthophorus 2.5-3.0 mm.longus,1.0-1.5 mm.latus,brevissime puberulus.Capsula 6.8 - 8.3 X 4.3-5.0 mm., ovoideo-oblonga, anthophoro 3-4-plo longior,calycem superans.Semina brunea, 1.0-1.3 mm.longa,plus minus compressa,dorso canaliculata,faciebus plana striata.

Turkey- Mt.Amanus: Kusliji dag,750-1500m., Aug.1908,Haradjian 247; Mt.Amanus,Aug.1906,Haradjian 470;Mt.Amanus,Gaiour dag 1200-1500m.,Aug.1892,Post-

Syria- Phurunluq nr. Massiab,north west Syria,450m., on shady bank near stream on serpentine;in forest of Plantanus,Alnus & Quercus (rain fall 2000mm.) 9-9-1952,H.F.Mooney 4580[holo.K].

Plate 6

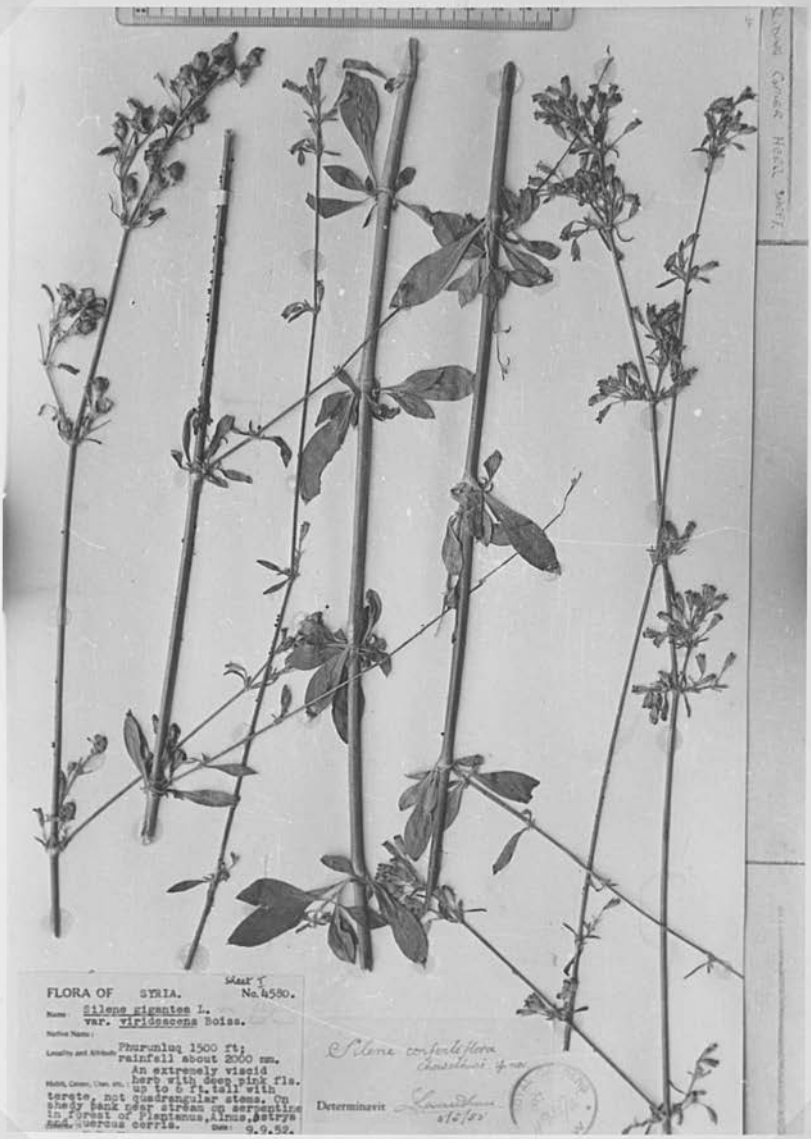


Plate 6-Silene confertiflora Chowdhuri

Fig.11

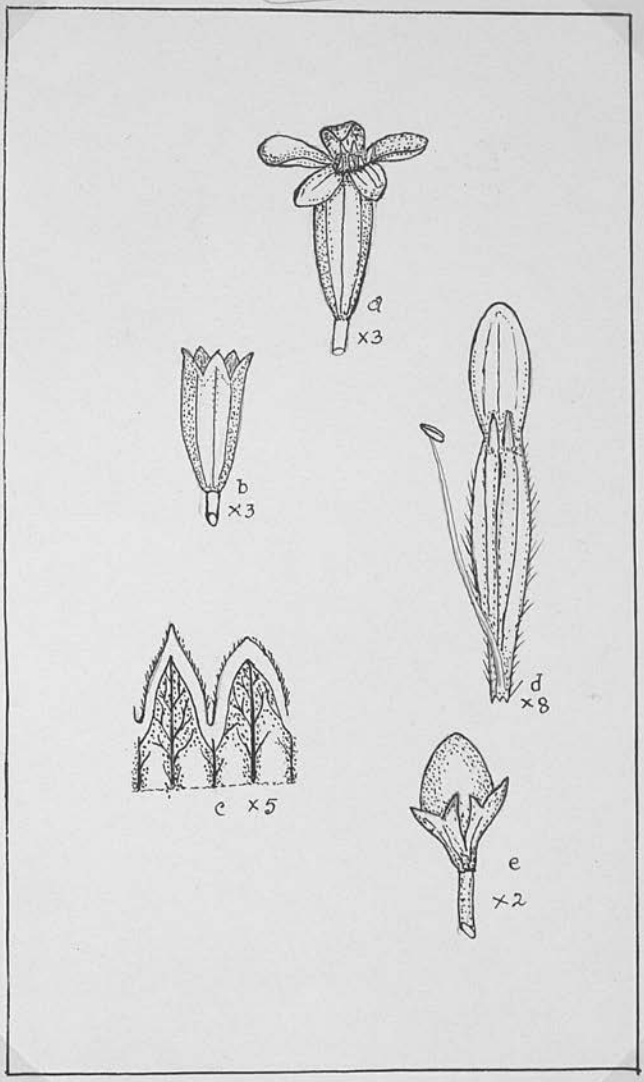


Fig.11.Silene confertiflora: a-flower;b-calyx;c-calyx teeth;d-petal;e-capsule with calyx.

SECTION 12 SPERGULIFOLIAE

The 13 species in this section are characterized by their caespitose habit,strong perennial,branched caudex,caudical leaves somewhat smaller than the usually conspicuous,often fasciculate cauline leaves,by the paniculate inflorescence,usually yellow flowers that are either unisexual or hermaphrodite,and by the filaments that are usually smooth.

Four subsections are recognized.

Subsection Polyphyllae contains 3 species with suffruticose stems,conspicuous linear or linear-spathulate recurved & fasciculate cauline leaves,hermaphrodite or dioecious-polygamous flowers,calyx slightly inflated and capsule not trisulcate.

Subsection Repentes with herbaceous stems,lanceolate cauline leaves,hermaphrodite or unisexual flowers having inflated calyces,and capsule not trisulcate.

Subsection Olgae contains 6 species with herbaceous stems but the leaves are ovate-lanceolate,the calyx not at all inflated,lobes of the petal limb emarginate,& the capsule not trisulcate.

The 4th subsection Brachycarpae contains 2 species having a caespitose habit,calyx not inflated and capsule is trisulcate.The plants are dioecious.

Key to the subsections and Oriental species.

1a. Capsule not trisulcate:

2a. Plants suffrutescent at the base;leaves linear,linear-lanceolate or linear-spathulate,usually fasciculate &

recurved;calyx more or less inflated at or after anthesis 12A.SubsectionPolyphyllae

3a. Filaments pilose;limb oblong;calyx oblong-ovate 40.S.stenobotrys

3b. Filaments smooth;limb cuneate;calyx cylindrical-clavate or clavate :

4a. Flowers hermaphrodite;claw usually ciliate;capsule 2-3 times as long as anthophore;calyx cylindrical-clavate 39.S.spergulifolia

4b. Flowers dioecious-polygamous;claw smooth;capsule subsessile;calyx clavate 41.S.armeniaca

2b. Plants herbaceous;leaves lanceolate or ovate-lanceolate, seldom fasciculate,straight;calyx usually not inflated:

5a. Limb bipartite;lobes entire;claw ciliate;calyx more or less inflated;leaves lanceolate,sometimes fasciculate .....12B.Subsection Repentes

5b. Limb bipartite;lobes emarginate or cleft;claw smooth; calyx not inflated;leaves ovate-lanceolate,not fasciculate .....12C.Subsection Olgae

1b. Capsule trisulcate: 12D.SubsectionBrachycarpae

6a. Calyx tubular,7.0-11.0 mm.long;capsule ovoid-conical 42.S.brachycarpa

6b. Calyx clavate-oblong,3.0-5.0 mm.long in female flowers; capsule oblong-conical 43.S.cappadocica

39. S.spergulifolia (Desf.) M.B.,Fl.Taur-Cauc.,iii,305(1819).

Caespitose perennial,10.0-40.0 cm.tall.Root deepseated ,

woody,often fusiform,with a multicipital crown.Caudices several, slender,elongated upto 15 cm.,branched,often with marcescent shreds of old petioles.Stem erect,ascending or arcuate,terete, leafy,simple below,branched upwards,glabrous or minutely & thinly retrorse puberulent below,becoming more or less glabrous in the middle & conspicuously puberulent and sparingly glandular above,especially in the region of inflorescence,seldom puberulent throughout;middle internodes 2.5-9.3 cm.long;nodes more or less swollen.Leaves monomorphic,1.3-4.5 cm.long,1.3-3.3 mm.wide,linear, linear-lanceolate to linear-spathulate,usually recurved and fasciculate,scabrous-puberulent;caudical and lower cauline leaves subsessile or shortly petiolate,small;other cauline leaves sessile,conspicuous.Inflorescence a panicle;cymules opposite or alternate,short or long,1-3(5)-flowered.Bracts and bracteoles equal,ovate-acuminate or ovate-lanceolate,acute, with hyaline ciliate or more or less villose margin.Pedicels 1.5-4.0 (6.5) mm.long,erect.Flowers erect,hermaphrodite,more or less crowded at the apices of cymules.Calyx 9.0-11.3 mm.long, 1.8-2.3 mm.diam., cylindrical-clavate,truncate,with 10 usually greenish anastomosed nerves,puberulent and viscidly glandular, in fruit clavate and slightly inflated,and with the base more or less narrowed below the capsule;teeth 1.3-2.3 X 1.0-1.5 mm., ovate,obtuse with hyaline ciliate margin.Petal white or greenish, 1.1-1.25 cm.long; claw 5.9-6.3 mm.long,somewhat exserted,ciliate or smooth,exauriculate;limb 4.5-5.7 X 1.8-2.5 mm.,cuneate, bipartite to 3/4 of its length into linear lobes,lobes entire, seldom emarginate;ligules two,0·5-0.8 mm.long,ovate,obtuse. Filaments exserted,smooth.Styles 3,exserted,minutely puberulent.

Anthophore 2.5-5.0 mm.long,hairy.Capsule 5.0-8.0 X 3.3-4.0 mm., ovoid-conical,2-3 times as long as anthophore,included.Seed dark brown,0.8-1.0 mm.long,with concave face and grooved back, tuberculate.Ch.

Key to the varieties.

Stem more or less weak;leaves usually recurved;panicle usually short & congested;calyx glandular-puberulent,usually not hirsute at the nerves .....a.var. spergulifolia

Stem bushy;leaves usually straight;panicle long and lax;calyx glandular-puberulent and hirsute at the nerves .....b.var. arbuscula

a. var. spergulifolia . Boiss.,Fl.Or.,i,612 (1867);Rohrb.,Monogr. Sil.,206 (1868)-Reichb.,Ic.Fl.Germ.Helv., vi,t.292,fig.5101 (1844);Desf.inAnn.Mus. Paris,xi,t.43 (1808).

Syn. Cucubalus spergulifolius Desf.,Choix Coroll.,73(1808).

Silene polyphylla M.B.,Fl.Taur-Cauc.,i,388(1808);non Linn.(1753);nonVill (1789);non Baumg. (1816);nonOrsini (1830).

S.spergulifolia M.B.,Fl.Taur-Cauc.,iii,305(1819);non Griseb.(1843);non Schur (1853).

Cucubalus caespitosus Poiret,Encycl.,x,416: with syn. S.verticillata Otth in DC.,Prodr.,i, 370 (1824).

S.spergulifolia var.elongata Boiss.,Fl.Or.,i,612(1867).

S.spergulifolia var.clavata Trautv.in Acta .Hort.Petrop.,ii, 508(1873).

S.spergulifolia var.ellipsoidea Trautv.,ibid.

S.spergulifolia var.unguiglabra Sint.,It.Or,no.5944b(1894) ms.

Plant scabrous-pubescent,tufted.Stem more or less weak, ascending or erect or arcuate.Leaves linear,linear-subulate or linear-lanceolate,recurved,ciliate at the base.Panicle usually short & congested,sometimes loose and long.Calyx glandular-puberulent,in fruit clavate with prominent nerves.

TURKEY-Armenia,sine loco,Zohrab 159 ;ibid.June 1834,Montb.;ibid. Rally 190 .Prov. Gumusane: Kursul nr.Pagum,6-61898,Sint. 5944 . Prov.Erzurum:Tech dag above Erzurum,18-2100m.,June1853,Huet . Prov.Ankara: bergstepe,25-51933,Kotte;Goebasi,23-5-1936,Kranse5024; Felssteppe,25-5-1933,Kotte .Cappadocica,sine loco,Aucher 472 ; Ak dag,Aucher 460 ;ibid. Montb.. Prov.Maras:dt.Goksun,Binboga dag,N. side of Isik dag,15-7-1952,Davis 20042 ;Ahir dag,1800m., July1907,Harad.1608 .Prov. Seyhan: Bozanti,3km.from Guneyi,800m., 15-5-1952,Demiriz 1294 .Prov.Bitlis:Pelli dag above Pelli,3000m., 7-7-1954,Davis 22487;E. flank of Nemrut dag,between Tatvan & Sogurt,1800m.,3-7-1954,Davis 23539 ;Nemrut dag above Sogurt,N. slope,2240m.,3-7-1954 Davis 23564 .Prov.Van: dt.Satak Kavussahap dag,2700m.,24-7-1954,Davis 23057.

IRAQ- Prov.Mosul,Mt.Gara,25-7-1841,Ky. ; ibid.a.1841 Ky.322 . Zawitah,9-1200m.,28-7-1933,Guest 4667; Matina,1700m.,15-5-1947 Rawi 8712.

IRAN- Between Isfahan & Teheran,May 1859,Bunge ;Bayazis,Aucher4210; Mt.Seidkhodji,Aucher 4212 ;Yam,24-6-1928,Gilliat-Smith 2347; Hills nr.Band,1500m.,14-5-1929,Cow.& Darl. ;Kushji Gadeegi Pass, 45m. from Khoi,1650m.,12-5-1929,Cow.& Darl. ;Ushun,Manbershim, 1800m.,31-5-1929,Cow. && Darl.

b. var. arbuscula (Fenzl ex) Boiss.,Fl.Or.,i,612 (1867).

Syn. S.arbuscula Fenzl in Ky.Pl.Pers.no398(1842)ms.

Plant glabrous or scabrous below,becoming puberulent above,

especially in the region of inflorescence.Stem bushy,erect.Leaves linear-lanceolate,straight or slightly curved,glabrous,ciliate at the base.Panicle long and loose.Calyx glandular-puberulent and hirsute along the nerves.

Type-in Persiae australes montibus ad Persepolim Ky.398 [holo.G.; iso.K'.]

IRAN- Between Teheran & Isfahan,Bunge ;nr.Schahrud,May 1858,Bunge; Luristan,Mt.Sawers,2400m.,July1868,Hausskn. ;Kuh-Ajab nr. Persepolis,19-5-1842,Ky.;Kuh Saebs Buschom,30-6-1885,Stapf 2355.

Geogr. (of sp.) Turkey,Iraq,Iran and Caucasus.

Habitat (of sp.) - On mountains and rocky places;alt.-800-3000m.

Fl.-May-July.

S.spergulifolia is somewhat variable,but does not seem to have developed any distinctive population except var. 'arbuscula' worthy of taxonomic recognition.Williams recognized two 'lusus' and Boissier recognized the var. elogata on the basis of inflorescence,shape of seed and nature of the stem, but with increasing herbarium materials it is evident that these are not worth recognition

S.spergulifolia is similar in habit,inflorescence & inflation of calyx to S.Montbretiana Boiss..It can however, be well distinguished from S.Montbretiana by the shape of leaves and calyx and form of capsule.Its relationship with S.supina M.B. is also evident by the general habit,inflorescence & shape of petal,but it is set off from the latter by its inflated calyces,fasciculate leaves,and ciliate claw.

As will be seen from the specimen cited,var.arbuscula has a narrow range than var.spergulifolia,being confined to Iran.

40. S.stenobotrys Boiss. et Hausskn. in Boiss.,Fl.Or.,i,611 (1867); Rohrb.,Monogr.Sil.,195 (1868);Post,Fl.Syr. Pal.& Sinai,ed2.i,182 (1932)-Bouloumoy,Fl.Lib.& Syr.,t. 49,fig.1 (1930).

Syn. S.supina Aucher no.482 ms.;non M.B.(1808).
S.spergulifolia var.stricta Fenzl in Ky.Pl.Exs.
S.paniculata Ehrbg herb ex Rohrb.,Monogr.Sil.,195(1868).

Perennial,20.0-46.7 cm.tall.Root deep-seated,woody,with a multicipital crown.Stems several from the crown,slender,leafy, simple below,branched from the middle upwards,pruinose & puberulent with retrorse hairs,upper part puberulent and viscidly glandular and usually hirsute;middle internodes 1.7-5.3 cm.long. Leaves monomorphic,1.3-4.4 cm.long,0.8-1.5 mm.wide,linear or subulate,base with hyaline ciliate margin;leaves of the sterile shoot fasciculate,puberulent.Inflorescence a panicle;cymules opposite,ascending-erect,3-5-flowered,sometimes 1-2-flowered. Bracts and bracteoles equal,lanceolate,acuminate with hyaline villose margin.Pedicels 1.5-4.0 mm.long,erect.Flowers hermaphrodite, erect, more or less congested .Calyx 7.5-11.0 mm.long,3.0-3.3 mm.diam.,ovate-oblong,truncate,with 10 anastomosed nerves, glandular-puberulent and hirsute,viscid,teeth 2.5-3.5 X 1.3-2.0 mm.,oblong,obtuse,with hyaline glandular-ciliate margin.Petal white,8.5-13.0 mm.long;claw 5.5-8.3 mm.long,more or less exserted, exauriculate,villose at the margin;limb 3.0-4.7 X 1.3-2.0 mm., oblong,bipartite into linear lobes;ligules two,0.5-0.8 mm.long, ovate.Filaments exserted,pilose.Styles 3,exserted,smooth. Anthophore 1.8-2.5 mm.long,villose.Capsule 5.5-7.0 X 3.5-4.0 mm.,

ovoid,acuminate,3-4 times as long as anthophore,included.Seed greyisg brown,1.8-2.0 mm.long,with flat face and grooved back, granulate.Ch.

Type- Turkey-in cretaceis (Syriae) ad Aintab et Marasch , Aucher 480 & Hausskn. [holo. G.;iso.K'.,BM'.]

TURKEY- Prov.Elazig: Harput above Pekinik,12-6-1889,Sint.670 . Prov. Mardin:Mardin,31-5-1888,Sint.869. Prov. Gaziantep:Gaziantep, Aucher 482 ;ibid. Montb.1990;between Gaziantep and Maras,a1867, Hausskn.

SYRIA- between Damascus & Palmyra,1200m.,26-5-1855,Ky.475.

IRAQ- Prov.Mosul,foot of Karadsche dag,a1841,Ky.185; Zawitah, 825m.,30-7-1933,Guest 4814; Jebel Baykhair,nr.Zakho,15-6-1934, Field & Lazar 777.

Geogr. Turkey,Syria,Iraq and Iran.

Habitat-Chalky places,sometimes in the crevices of rocks; alt.-825-1200m. Fl.-May-July.

The nearest species are S.spergulifolia and S. armeniaca ,especially the former.It is distinguished by its narrow,more or less straight leaves,oblong-ovate calyx, oblong limb and pilose filaments.Ecologically it seems to be limited to calcareous districts.

41. S.armeniaca Rohrb. in App.Alt.Ind.Hort.Berol.,5 (1867); Rohrb.,Monogr.Sil.,209 (1868).

Syn. S.pruinosa var. fasciculata Boiss. in Bourg.Pl.Arm. no.114 ms.

S.Brotherana Som.et Lev. in Act.Hort.Petrop.,xiii,36(1893).

S.pruinosa var. armeniaca Williams in Journ.Linn.Soc.,

xxxii,163 (1896).

S.spergulifolia in Brotherns ,Exs.no.138 (1881)ms.

Caespitose perennial,20.0-40.0cm.tall.Root woody deep-seated,with a multicipital crown.Caudex slender,ascending or erect,branched,covered with the bases of old leaves.Stem slender,terete,leafy,erect or arcuate,simple below,branched above;nodes swollen;internodes 1.3-2.7 cm.long.Leaves monomorphic, 1.3-2.9 cm.long,1.5-3.0 mm.wide,linear or linear-lamceolate, usually fasciculate and curved,base with hyaline ciliate margin,scabrous to more or less puberulent.Inflorescence a panicle;cymules short,usually alternate,3-5- or 1-2- flowered. Bracts & bracteoles equal,ovate,acuminate,3-nerved,scabrous, base with hyaline ciliate margin.Pedicels 1.0-4.0 mm.long,erect. Flowers dioecious-polygamous,erect,crowded at the apices of cymules.Calyx 5.0-7.5 mm.long in female flowers and 1.0-1.2 cm. long in male flowers,2.8-3.0 mm.diam.,clavate, more or less inflated,truncate-umbilicate,with 10 anastomosed nerves, glandular-puberulent and hirsute,in fruit obovate with base more or less narrowed below the capsule;teeth 1.0-1.5 X 0.8-1.0 mm.,ovate,obtuse,with hyaline ciliate margin.Petal white,7.5-9.0 mm.long in female flowers and 1.1-1.3 cm.long in male flowers; claw 5.5-7.3 mm.long,usually smooth,exauriculate;limb in female flowers 2.0-3.0 X 1.0-1.3 mm., in male flowers 4.0-5.3 X 1.8-2.3 mm.,cuneate,bipartite into triangular obtuse lobes;ligules absent.Filaments exserted,smooth.Styles 3,exserted,hairy. Anthophore in female flowers 1.5-2.5 mm.long,while in male flowers 3.3-4.0 mm.long,hairy.Capsule 5.0-6.3 X 2.8-3.3 mm.,

ovoid-conical,subsessile,included.Seed dark brown,0.8-1.0 mm.long, with flat face and convex granulate back.Hp.

Type- Turkey-in collibus pr.Gumusckkhane in Armenia,Bourgean.

TURKEY- Prov.Gumusane:Gumusane,Agha Koei,20-6-1894,Sint.5935; Gumusane at Wang,28-5-1894,Sint.5685;Gumusane,28-5-1862, Bourg.114 .Mts of Kurdistan,Ball ;ibid.Lauard 90.

Geogr. Turkey & Caucasus.

Habitat-On mountains . Fl.-May & June.

S.armeniaca appears to be closely related to S.spergulifolia , the two species being alike in general habit, & in the general characters of calyx,leaves & capsule.But S.armeniaca differs in its dioecious flowers,short clavate calyx and smooth claw.In the relative length of capsule & anthophore S.armeniaca differs further from S.spergulifolia.

The species shows some affinities to S.ampullata which will be discussed under that species.

SUBSECTION 12D BRACHYCARPAE

42. S.brachycarpa Boiss. et Bal.,Diagn.Pl.Nov.Or.,Ser.11.vi,29(1859); Boiss.,Fl.Or.,i,613 (1867);Rohrb.,Monogr.Sil.,208 (1868).

Syn. S.fasciculata Boiss.et Heldr.,Pl.Exs.ex Boiss.,Fl.Or.,i, 613 (1867).

Caespitose perennial,5.7-34.0 cm.tall.Root stout,fusiform, deep-seated,with a multicipital crown.Caudex short,decumbent, covered with the bases of old leaves,branched .Stem erect or ascending,often arcuate,terete,leafy,simple below,branched above, canescent,densely retrorse puberulent,sometimes tomentulose

throughout;nodes more or less swollen;middle internodes 1.0-3.5 cm.long.Leaves monomorphic,0.7-3.2 cm.long,1.5-5.0 mm.wide, lanceolate to linear-lanceolate,acute or obtuse,base with hyaline ciliate margin,densely pubescent on the dorsal surface, ventral surface sparsely so.Inflorescence a panicle;cymules 5-7-flowered,(lower ones alternate,upper ones opposite).Bracts and bracteoles equal,ovate,acute,with hyaline ciliate margin. Pedicels 1.0-3.5 mm.long,erect.Flowers dioecious-polygamous, erect.Calyx 7.0-11.0 mm.long,3.0-3.8 mm.diam.,tubular,umbilicate, with 10 greenish anastomosed nerves,glandular-puberulent & viscid,in fruit clavate with constricted base;teeth 1.0-1.3 X 0.8-1.3 mm.,ovate,obtuse,with hyaline ciliate margin.Petal white,8.5-13.0 mm.long;claw5.0-7.6 mm.long,exserted,smooth, exauriculate;limb3.5-5.0 X 1.5-2.0 mm.,cuneate,bipartite into linear lobes;ligules two,0.5-1.0 mm.long,ovate,obtuse.Filaments exserted,smooth.Styles3, exserted, minutely hairy.Anthophore 2.0-4.0 mm.long,hairy.Capsule 4.0-6.0 X 3.0-4.0 mm., ovoid-conical, trisulcate,subsessile,protruding beyond calyx.Seed dark brown, 0.8-1.3 mm.long,with flat tuberculate face & grooved granulate back.Hp.

Type- Turkey- in parte superiori vallis Kamechli Tchai Cappadociae alt.14 m.,Balansa [holo.G.]

TURKEY- Prov.Ankara:Ankara,a1892,Bornm.3212 ;bergsteppe,2-6-1933, Kotte ;ibid. 28-5-1932,Kotte . Prov.Cankiri:Cankiri,8-900m., 3-7-1929,Bornm.13339 .Prov.Kayseri:Kayseri,1107m.,1-7-1856, Bal.1045 .Prov.Bitlis:foot of Nemrut dag,1800m.,3-7-1954,Davis 23578.Prov.Kutahya:Alma dag nr.Osak,10-6-1857,Bal.1309 . Prov. Konya: Yavsan Memlchasi nr.Tuzgolu,7-6-1952,Davis 18656 .Prov. Burdur:Burdur,Tekirova,21-5-1950,Heilb.&Atilla .Prov.Antalya: Elmali,10-5-1860,Bourg.62.

Geogr. Endemic to Turkey.

Habitat- On mountains ; alt.-800-1800m..Fl.- May-July.

This species is closest to S.spergulifolia,from which it differs in average height,shape & form of leaves, calyx not inflated at or after anthesis,dioecious flowers, and lastly in its trisulcate capsule.It is also close to S.cappadocica ,from which it is set off by its small oblong-clavate calyx,in the density & nature of indumentum,and oblong-conical capsule.

43. S.cappadocica Boiss.et Heldr.,Diagn.Pl.Nov.Or.,Ser.1.viii,86 (1849).

Caespitose perennial,20.0-45.0 cm.tall.Root stout, deep-seated,woody,with a multicipital crown.Caudex slender,erect or arcuate,becoming branched and suffruticose,covered with bases of old leaves.Stem erect or arcuately erect,terete,leafy, usually simple below,becoming branched above,densely puberulent throughout with white deflexed hairs,sometimes scabrous-puberulent below,becoming densely puberulent above;nodes swollen; middle internodes2.0-5.3 cm.long. Leaves monomorphic,1.5-3.7 cm.long,1.0-3.0 mm.wide,linear to linear-lanceolate,acute, puberulent,base with hyaline ciliate margin;caudical leaves petiolate,rosulate;cauline leaves sessile,conspicuous. Inflorescence a panicle;cymules alternate or opposite,3-7-flowered.Bracts equal,linear;bracteoles ovate,acute,with hyaline ciliate margin,3-nerved at the base.Pedicels 1.0-3.0 mm.long, erect. Flowers dioecious-polygamous.Calyx in female flowers 3.5-5.0 mm.long,1.5-2.5 mm.diam.,in male flowers 6.8-11.0 mm. long,2.5-3.0 mm.diam.,oblong-clavate,with 10 greenish anastomosed

nerves,pubescent,in fruit clavate with constricted base;teeth 0.5-1.0 X 0.3-0.5 mm.,ovate,obtuse,with hyaline ciliate margin, Petal pale greenish white,in female flowers 4.5-6.0 mm.long & in male flowers 9.0-12.0 mm.long;claw 4.0-6.0 mm.long,smooth, exauriculate;limb in female flowers 1.5-2.0 X 0.5-1.0 mm.,in male flowers 3.5-5.0 X 1.0-2.3 mm.,cuneate,bifid into linear lobes;ligules two,0.3-0.5 mm.long,ovate.Filaments exserted, smooth.Styles 3, exserted,hairy above.Anthophore in female flowers 1.5-3.0 mm.long,in male flowers 4.0-6.0 mm.long,hairy. Capsule 4.0-6.0 X 3.0-3.5 mm.,oblong-conical,trisulcate,subsessile, ½ exceeding calyx.Seed dark brown,1.0-1.3 mm.long,tuberculate, with flat face and back.Hp.

Key to the varieties.

Plant scabrous-puberulent below,becoming densely puberulent above;calyx in male flowers 6.0-7.5 mm.long,puberulent ..... a.var.cappadocica

Plant puberulent below,becoming glandular-puberulent above; calyx in male flowers 8.0-11.0 mm.long,glandular-puberulent .....b.var.glandulosa

a. var. cappadocica . Boiss.,Fl.Or.,i,611 (1867);Rohrb.,Monogr. Sil.,209 (1868);Williams in Journ.Linn. Soc.,xxxii,164 (1896).

Syn.S.Pestalozzae Boiss.,Diagn.Pl.Nov.Or.,Ser.1.viii,87 (1849).
S.cappadocica var.canescens Boiss.,Fl.Or.,i,611(1867).
S.spergulifolia var.macrorhiza Heldr.Pl.Exs.(1845).

Plants scabrous,puberulent below,becoming puberulent above with white deflexed hairs.Calyx in female flowers 3.5-5.0 mm.long, in male flowers 6.0-7.5 mm.long,puberulent or scabrous not glandular.

Type- Turkey-in Cappadocia Aucher 162,vineis arenosis Lycaoniae prope Noieh,Heldr. [holo.G.;iso.K'.,BM'.]

TURKEY-Armenia,sine loco.Calv.& Zohrab .Prov.Erzurum:nr.Erzurum, July1853,Huet ;ibid.Zohrab 156.Prov.Gumusane:Bayburt,17-7-1862, Bourg. .Cappadocica,Aucher472 ;ibid.Montb..Ak dag,18-6-1834, Montb.2097 . Prov.Tokat:Artowa above Tokat,1300m.,31-5-1890, Bornm.1715. Prov.Kayseri:Karamas dag,E.of Kayseri,3-7-1856, Bal.1044 .Prov.Nigde:between Taspinar & foot of Hasan dag, 15-61952,Davis 18876 .Prov.Antalya: Elmali,6-5-1853,Pichler; ibid.20-6-1860,Bourg.52.

b.var. glandulosa Freyn in Bull.Herb.Boiss.,iii,78 (1895).

Plants puberulent or scabrous-puberulent below,becoming glandular-puberulent above,Calyx in female flowers 4.0-5.5mm. long,in male flowers 8.0-11.0 mm.long,glandular-puberulent.

Syntype- Kastemuni:in collibus ad Tossia 13 Junio 1892 Sintenis 4224;Pontus Galaticus Amasia in vineis lapidosis 15 Mayo 1889 Bornmüller 71;Cappodocica australis,Hadschin:auf der Kleinen Hochebene Kala Sekisi 27 Mai 1893 Manissadijian 886.

TURKEY- Prov.Kastamonu:Tosya,Goekcewis in Mt.Bellowa,9-7-1892 Sint.4580.

Geogr.(of sp.) Endemic.

Habitat (of sp.)-On mountains & rocky places;alt.-400-1300m.

Fl.- May-July.

SECTION 13 AMPULLATAE

This section contains only one species,S.ampullata Boiss.. Rohrbach and Williams transferred it from the subgenus Silene to to the subgenus Behen,as the calyx is much inflated in fruit. But in the characters of flower,petal ,and habit it is very near to S.spergulifolia and S.armeniaca.Considering these points I have followed Boissier in keeping it in a separate section;this has been placed near the section Spergulifoliae .

44. S.ampullata Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,26 (1842).

Caespitose perennial,7.0-28.0 cm.tall.Root vertical, tapering,woody,with a multicipital crown;crown with many erect to semidecumbent leafy sterile shoots which in turn give rise to fertile shoots.Stems many from the sterile shoots,erect or arcuate,sometimes ascending,terete,leafy,simple below,becoming sparingly branched above,greenish,often purplish from the base upwards,densely puberulent and more or less hirsute with white septate hairs,viscid above;nodes more or less swollen;internodes 1.5-6.7 cm.long.Leaves on the sterile shoot linear,fasciculate; those on the fertile shoot 6.5-30.0 X 2.0-3.3 mm., the lower ones linear-lanceolate or linear-spathulate,usually smaller than the upper leaves;upper leaves ovate-lanceolate,conspicuous,sessile, 3-nerved at the base,acute,base with narrow hyaline margin;all leaves puberulent and more or less hirsute.Inflorescence a panicle;cymules usually alternate,erect,with 3-5 rarely 1-2 subsessile flowers.Bracts and bracteoles equal,ovate-lanceolate or

ovate-acuminate,3-nerved,ciliate,puberulent.Pedicels 1.5-3.5 mm.long,erect or ascending,viscid-puberulent.Flowers unisexual, dioecious sometimes polygamous,crowded at the apices of cymules. Calyx in female flowers 8.0-9.5 mm.long and 3.0-3.5 mm.diam., in male flowers 1.0-1.3 cm.long and 3.0-3.5 mm.diam.,ovate-campanulate or ovate-oblong,membraneous,greenish or yellowish, umbilicate,with 10 anastomosed nerves,puberulent,infruit ovate or ovate-globose,much inflated with contracted apex;teeth 0.8-1.7 X 1.0-1.3 mm.,ovate,obtuse or round,with wide hyaline pilose margin.Petal white,often cream coloured or greenish,in male flowers 1.0-1.3 cm.long;claw 6.0-7.5 mm.long,expanded above , equalling calyx,exauriculate;limb 4.0-5.5 X 1.5-1.8 mm.,ovate-oblong,bifid into linear lobes;ligules two,minute;in female flowers petal are 6.0-7.5 mm.long,included,emarginate,eligulate, Filaments exserted,smooth.Styles 3,exserted,hairy.Anthophore 3.0-4.0 mm.long,smooth.Fruit 3.0-4.5 X 2.5-3.0 mm.,subglobose, 1-3-seeded,indehiscent,as long as anthophore,included.Seed dark brown,1.8-2.5 mm.long,with more or less concave face & back,granulate.Hp.

Key to the varieties.

Plants and calyx eglandular;claw of the petal smooth
.....a.var.ampullata

Plants glandular above;calyx glandular-puberulent;claw usually ciliate
.....b.var.glandulosa

a. var. ampullata.

Plants puberulent,more or less hirsute,eglandular

throughout.Calyx puberulent & hirsute,eglandular.Claw smooth; auricles minute or lacking.

Type- Turkey-in Cappadocica Orientali Aucher 491[holo.G.;iso.K8.,BM'.]

TURKEY- Prov.Urfa:Kara dag (Kurd dagh),1200-1500m.,May 1907, Harad.1171; sine loco,Aucher 492.

SYRIA- Between Aleppo & Malatia,Montb.2081.

IRAQ- Mosul,a1841,Ky.185;Matina,1800m.,15-5-1947,Rawi8738 ; Qara dag,14-1600m.,13-4-1947,Gillett 7921 ;Khantur,1700m., 11-5-1947,Rawi 8784;Sefin Bagh,above Shaqlawa,1350m.,9-5-1947, Gillett 8146; Jebel Baradost nr Diana Rowandiz,Field & Lazar 916.

IRAN- Hamadan,a1882,Pichler ;Mt.Elwend,Aschabaf pass,2250m., 4-6-1932,Balls 103;Mt.Elwend (middle),a1882,Polak ;Kuh Sefin Assyria,12-1600m.,12-5-1893,Bornm.876;Mts below Sivik,2100m., 20-5-1929,Cow.&Darl.1298 ;Bakhtiari,Watt 13137 & 13138 ; Kurdistan,sine loco,June 1852 Olguin.

b. var. glandulosa Bornm.in B.B.C.,xix,215 (1906).

Plants puberulent and hirsute throughout,becoming glandular above.Calyx glandular-puberulent and more or less hirsute.Claw ciliate;auricles minute.

Type- Iran-Sultanbad,in callibus May 1890.Bornm.

TURKEY- Prov.Elazig:Harput, 10-5-1889,Sint.284 .Prov.Maras: Berit dag,1800m.,14-5-1934,Balls 1091.

Geogr. (of sp.) Endemic to the countries cited above.

Habitat (of sp.)- On granite rock & other rocky places of mountain sides;alt.-1200-2300m..Fl.-May & June.

This species shows a considerable resemblance to S.armeniaca & S.spergulifolia in the shape & fasciculation of leaves,in the indumentum and in the inflated calyx.The shape of

petal in both S.armeniaca & S.ampullata,is so far the male flowers are concerned,is similar.But S.ampullata differs from S.armeniaca by the much inflated fruiting calyx as well as in the character of the fruit;they are certainly closely related. S.ampullata,in its fruit,approaches the genus Cucubalus ,but differs from C.baccifer Linn. in general habit,and floral characters .

SECTION 14 CAESPITOSAE

The 8 species that have been included in this section are characterized by their low stature, caespitose habit, linear or linear-lanceolate leaves, raceme-like or racemosely paniculate inflorescence, and ciliate claw. These 8 species fall into 2 subsections on the characters of inflorescence, shape of calyx, and shape & form of capsule.

Subsection Dianthoidae consists of only 2 species that have racemosely paniculate inflorescence, obconical-campanulate calyx and obovoid capsule; the claw and limb are not well differentiated. The ligules are usually absent, seldom minute.

Subsection Stenophyllae contains 6 species which have raceme-like inflorescence; rather large flowers (usually nodding), and a cylindrical- or ovate-clavate calyx. The petal in these species is well differentiated into claw and limb, and is ligulate; the capsule is ovoid-oblong or ovoid.

Key to the subsections.

Inflorescence racemosely paniculate; calyx ovate-campanulate or obconical-campanulate, becoming obovoid or turbinate in fruit; claw & limb not well differentiated; capsule obovoid
.....14A. Subsection Dianthoidae

Inflorescence raceme-like; calyx ovate- or cylindrical-clavate, becoming usually clavate in fruit; claw & limb well differentiated; capsule ovoid-oblong or ovoid
.....14B. Subsection Stenophyllae

SUBSECTION 14A. DIANTHOIDAE

45. S.dianthoides Pers.,Syn.Pl.,i,500 (1805);Boiss.,Fl.Or.,i,610 (1867);Rohrb.,Monogr.Sil.,197(1868)-Komarov, Fl. U.R.S.S.,vi,t.xxxvii,fig.3 (1936);Schreber,Dec., t.5(1766).

Syn. Cucubalus saxifragus Linn.,Mant.,I,71(1767)-non Silene saxifraga Linn.,I,421(1753);non Lmk.(1778);non Schang.

Silene melanophylla Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,24 (1842).

S.dianthoides var.typica Trautv.in Act.Hort.Petrop.,11, 511(1873).

S.dianthoides var.glabrata Trautv.,ibid.

Caespitose perennial,7.3-25.0 cm tall.Root woody,tapering, vertical,with a multicipital crown.Caudex 1.5-7.0 cm.long,2.0-4.5 mm.wide,erect or ascending or more or less prostrate,branched, covered with the bases of old leaves and bears vegetative buds. Stem erect or arcuate at the base,terete,slender,simple below, branched in the region of inflorescence,usually purplish from the base upwards,often with glaucous bloom,usually densely puberulent below,glabrous and viscid above,sometimes glabrous throughout; middle internodes 2.1-6.3 cm.long.Caudical leaves rosulate, 5.0-27.0 mm.long,0.5-2.5 mm.wide,linear-lanceolate or linear-subulate,usually subfalcate,puberulent,base with hyaline ciliate margin;cauline leaves 2-3 pairs,remote,bract-like,5.0-13.0 mm. long,0.5-1.3 mm.wide,ovate-lanceolate,acute,base with ciliate margin.Inflorescence racemosely paniculate;cymules opposite, 1-3-flowered,rarely 1-flowered.Bracts & bracteoles equal,ovate

to ovate-lanceolate,acute,1-3-nerved,eith wide hyaline ciliate margin.Pedicels 1.0-10.0 mm.long,erect or ascending.Flowers hermaphrodite,erect.Calyx 4.9-7.0 mm.long,3.0-3.5 mm.diam., obconical-campanulate,pinkish,glabrous,with 10 simple or slightly anastomosed nerves,truncate,in fruit turbinate;teeth 1.3-2.0 X 1.3-2.3 mm., ovate,obtuse or round,with wide hyaline ciliate margin.Petal pink or white with slight pink wash & veins on the reverse;claw 2.5-4.0 mm.long,equalling calyx,expanded, exauriculate,ciliate;limb 3.0-4.0 X 2.0-3.3 mm.,cuneate,bipartite into oblong-linear lobes;lobes entire round or emarginate;ligules 0.3-0.5 mm.long,obtuse,often absent.Filaments exserted or included, smooth.Styles 3,exserted or included,smooth.Anthophore 1.3-2.0 mm.long,thick,smooth. Capsule 4.0-8.0 X 3.0-4.3 mm.,obovoid, 3-4 times as long as anthophore,included.Seed dark brown,0.5-0.9 mm.long,with flat tuberculate face and grooved granulate back.Chh.

Type- Turkey-inOriente.

TURKEY-Prov.Gumusane:Berdak nr.Bayburt,28-7-1862,Bourg.46; between Halbder & Stadt,1100m.,15-61931,Gorz 532;Mt.Aktas (Argyri dag),10-7-1894,Sint.5683.Prov.Erzincan:Kemaliye in Jokari dag,6-6-1892,Sint.2497;Sipikeur pass,2274m.,26-6-1934, Balls 1547 ;Kemaliye nr. Firat river,Kainar dag,24-6-1889, Sint.878 .Armenia : sine loco,Calv.& Zohrab .Prov. Erzerum: Tech dag above Erzerum,1800-2100m.,July 1853,Huet ;ibid.2400-2700m.,July 1852,Huet ;Erzerum,Zohrab 107 & 171.Prov.Erzincan/ Sivas:Rafahiye to Suchehir,1620m.,24-6-1943,Balls 1491;Ak dag, Montb.2250 . Prov.Sivas:Mt.Camlibel between Tokat & Sivas,1800m., 30-5-1890,Bornm.1692.Prov.Amasya: Amasya,Manassad.1165. Cappadocica,sine loco Aucher 487.Prov. Van,dt.Gevas:Artos dag, 3300m.,15-7-1954,Davis 22803 ;dt.Baskali: Ispiriz dag,3200m., 31-7-1954,Davis23777.Prov.Bitlis:Pelli dag above Pelli,3000m., 7-71954,Davis22471.

IRAN- Mts. above Daz Giri,2350m.,24-5-1929,Cow.& Darl.2419.

Geogr. Turkey,Iran and Caucasus.

Habitat- Rocky places,screes,cliffs & lime stone rocks;alt.-1100-3000m..Fl.-May-July.

S.dianthoides is a somewhat variable species,apparently limited to the Irano-Touranian region of Turkey,Iran and Trans-Caucasus.It is most similar to the genus Gypsophila in habit, shape of the calyx and particularly because of the undifferentiated claw & limb of the petal.But it stands out sharply from Gypsophila by the presence of commissural nerves and 3 styles.

S.dianthoides is apparently not closely related to any other Oriental Silenes.It is somewhat variale with respect to its indumentum,but does not seem to have developed any population worthy of taxonomic distinction.

SUBSECTION 14B. STENOPHYLLAE

46. S.pharnaceifolia Fenzl,Pugill.Fl.Nov.Syr.,26 (1842);Boiss.,Fl. Or.,i,610 (1867);Rohrb.,Monogr.Sil.,196(1868)-Russegg.,Ill.Pl.Taur.,t.10.

Caespitose perennial,3.0-17.0 cm.tall.Root vertical, deep-seated,tapering,with a multicipital crown,sometimes bears vegetative buds.Caudex erect,ascending or decumbent,3.0-13.0cm. long,2.0-5.0 mm.wide,slender,woody,with leaf scars on the old portion and leaf bases on the young part.Stem erect or arcuate at the base,terete,usually purplish from the base upwards,simple below,sparingly & pedicellately branched above,sparsely or densely puberulent,sometimes more or less viscid;middle internodes 3.5-29.0 mm.long.Caudical leaves rosulate,0.8-4.3 cm. long,0.3-1.3 mm.wide,linear,plicate,straight,base with wide

hyaline margin;cauline leaves in a few pairs,5.0-11.0 mm.long,0.5-1.5 mm.wide,lanceolate,acute,rarely ovate-lanceolate,3-nerved,sessile, base with hyaline margin;all leaves puberulent or scabrous-puberulent, rarely scabrous,with ciliate or villose margin.Inflorescence raceme-like,1-5-flowered.Bracts & bracteoles equal,ovate-lanceolate, acute to acuminate,3-nerved,with wide hyaline villose margin. Pedicels 2.0-14.0 (25.0) mm.long,erect or ascending.Flowers hermaphrodite,erect.Calyx 7.3-9.0 mm.long,3.5-4.0 mm.diam., ovate-clavate,with 10 pinkish nerves which are anastomosed above, scabrous to puberulent,truncate-umbilicate;teeth 1.3-2.3 X 1.0-2.0 mm.,ovate,obtuse or round,with wide hyaline ciliate margin.Petal pink,8.0-12.0 mm.long;claw 5.3-7.0 mm.long,ciliate,exauriculate; limb 2.7-5.0 X 2.5-3.5 mm.,obcordate-cuneate or obovate-cuneate, emarginate to bifid;ligules two,1.3-1.8 mm.long,oblong,obtuse or round,sometimes oblique and denticulate.Filaments included,smooth. Styles 3,included,more or less thick,hairy. Anthophore 1.0-2.3 mm. long,more or less thick,smooth.Capsule 4.5-6.0 X 3.0-3.5 mm., ovoid,5-6 times as long as anthophore,included.Seed dark brown, 0.9-1.3 mm.long,with flat face and back,granulate.Chh.

Type- Turkey-in alpium cacuminibus Touri occidentalis Ky.71 [holo. B?;iso.K'.,BM'.]

TURKEY-Cilician Taurus:Karli Boghas,Zev Steinen,2000m.,a1896, Siehe 329; Bulgar maaden,July & Aug.1855,Bal.;ibid.Bal.884 . Prov.Mersin: Gongelek Pass,1800m.,June 1910,Siehe 204.

Minor variant of S.pharnaceifolia.

(i) S.pharnaceifolia var.acaulis Siehe,Fl.Or.,no.205 (1910)ms.

Differs from the type mainly in the low stature,dense indumentum and pubescent calyx.The floral characters and leaf

shape are closely similar to those of the typical form. This variant occurs in the mountains of the Cilician Taurus along with the typical form, and hence is not treated here as a significant variety.

Turkey- Prov. Mersin: Gonelek Pass, June 1910, Siehe 205.

Geogr. Cilician Taurus (Turkey) and Lebanon.

Habitat- Alpine & subalpine; alt.-1800-2400m.. Fl.-June-Aug.

SECTION 15 SUFFRUTICOSAE

The 13 species of this section have a strongly suffruticose base,and usually leafy & branched stems,linear,oblong- to linear-lanceolate cauline leaves which are usually conspicuous & larger than the caudical ones,a paniculate inflorescence which often passes into a dichasium;cylindrical-clavate or clavate calyx which are usually provided with prominent pinkish nerves; bipartite,usually minutely auriculate petal;and stipitate capsule.

The members of this section fall into 3 subsections on the basis of leaf shape & size and their fasciculation,and the presence or absence of hairs from the petal claw & filaments .

Subsection Supinae contains 3 species and the plants belonging to these species are provided with linear or linear-spathulate leaves that are often fasciculate and tubular or tubular-clavate calyx which is narrow,and smooth claw & filaments.

Subsection Aucherianae comprises 8 species,and the plants have generally lanceolate or oblanceolate leaves which are not fasciculate,cylindrical-clavate or clavate calyx which are broad and often slightly inflated,and smooth claw and filaments.

Subsection Tomentellae contains 2 species which are characterized by linear-lanceolate leaves,and ciliate claw and filaments .

Key to the Subsections and Orietal species.

1a. Claw and filaments smooth:

2a. Cauline leaves linear or linear-spathulate;calyx narrowly tubular or tubular-clavate,not inflated at or after anthesis;claw exauriculate

.....15A.Subsection Supinae

3a. Limb oblong;claw equaling calyx;capsule ovoid;plants from Afghanistan & Baluchistan 48.S.brahuica

3b. Limb cuneate;claw exserted;capsule ovoid-conical;plants from Turkey,Iraq & Iran .....47. S.supina

2b. Cauline leaves usually lanceolate or oblong-lanceolate, sometimes ovate-lanceolate;calyx cylindrical-clavate or clavate often slightly inflated;claw usually minutely auriculate .....15B.Subsection Aucherianae

4a. Capsule as long as or slightly longer than anthophore; calyx not so strongly nerved,nerves never becoming acutely angled in fruit;leaves usually straight and generally 1-nerved:

5a. Plants glandular-puberulent,atleast in the upper part;calyx glandular-puberulent;anthophore puberulent (except S.persica):

6a. Anthophore hairy;flowers white;calyx strongly umbilicate with obtuse teeth:

7a. Capsule oblong-conical;calyx 2.3-2.6 cm.long .....54. S.oreophila

7b. Capsule oblong;calyx 0.9-1.5 cm.long 49.S.Montbretiana

6b. Anthophore smooth;flowers pink,seldom dirty white; calyx truncate-umbilicate with acute teeth 52.S.persica

5b. Plants eglandular;anthophore scabrous or smooth; calyx eglandular:

8a. Calyx umbilicate,with acute teeth;plants pubescent,sometimes hirtellous 50.S.eriocalycina

8b. Calyx truncate-umbilicate,with obtuse teeth; plants glabrous & glaucescent 51.S.hirticalyx

4b. Capsule 3-4 times as long as anthophore;calyx strongly nerved,nerves angular in fruiting calyx;leaves usually subfalcate,3-nerved .....53. S.arguta

1b. Claw and filaments ciliate .....15C.Subsection Tomentellae

SUBSECTION 15A. SUPINAE

47. S.supina M.Bieb.,Fl.Taur.Cauc.,i,336 (1808) & iii,304 (1819).

Perennial,15.0-49.0 cm.tall.Root woody,deep-seated, with a multicipital crown.Caudex 5.0-20.0 cm.long,3.0-8.0 mm.wide, ascending or more or less erect,sometimes decumbent,becoming profusely branched & suffruticose,young portion covered with bases of old leaves.Stem erect to ascending,often arcuate at the base,terete,leafy,usually simple below,branched from the middle upwards,pubescent,hairs of varying nature;branches alternate, sometimes opposite,ascending;nodes more or less swollen;middle internodes 1.5-5.3 cm.long.Leaves monomorphic ,1.0-4.0 cm.long, 0.8-3.0 mm.wide,linear to linear-lanceolate,tapering at the base

or somewhat spathulate,base with hyaline ciliate margin, straight or slightly curved,1-nerved,with acute or obtuse apices,grey, retrorsely pubescent;caudical and lower cauline leaves rosulate ,usually smaller ;other cauline leaves conspicuous.Inflorescence a panicle,cymules alternate, rarely opposite,3-5- or 1- flowered,sometimes plant 1-2-flowered.Bracts equal,linear-lanceolate,3-nerved at the base,base with hyaline ciliate margin,with the pedicels densely pubescent,hirsute to tomentulose,often sparingly glandular.Pedicels 2.0-11.0 mm.long, erect.Flowers hermaphrodite,often pistillate with rudimentary stamens,crowded at the apices of the cymules .Calyx (0.9) 1.1-2.3 cm.long,2.0-2.5 mm.diam.,cylindrical-clavate,yellowish green to pinkish,glandular-puberulent and viscid,in fruit clavate with constriction below the capsule,umbilicate;teeth 1.3-2.0 X 1.0-1.5 mm.,ovate,obtuse or oblong and round,with hyaline ciliate margin.Petal white,9.0-16.5 mm.long;claw 6.0-11.0 mm. long,exserted,smooth,exauriculate;limb 3.0-5.5 X 1.5-2.3 mm., cuneate,bipartite beyond middle into oblong-linear lobes;ligules two,0.8-1.3 mm.long,ovate,obtuse,round or emarginate.Filaments exserted,smooth.Styles 3, exserted,hairy above .Anthophore 4.0-7.0 mm.long,hairy.Capsule 6.0-10.0 X 3.0-4.5 mm.,oblong-conical,as long as or 1½ times as long as anthophore,included. Seed dark brown,1.0-1.3 mm.long,with flat face and grooved back, granulate.Ch.

Key to the subspecies and varieties.

1a. Plant & leaves puberulent below,becoming glandular-puberulent above;calyx 1.7-2.1 (2.3) cm.long;cymules 1-3-flowered .....i.subsp.supina

1b. Plant & leaves grey,retrorsely puberulent,often tomentulose or hirtellous above;calyx (0.9) 1.1- 1.6 cm.long;cymules 3-7-flowered,congested .....ii.subsp. pruinosa

2a. Flowers white:

3a. Plants tall,erect or ascending,usually many-flowered .....a.var. pruinosa

3b. Plants dwarf,few-1-flowered,decumbent .....b.var. alpina

2b. Flowers reddish;plants dwarf .....c.var. rubra

i. subsp. supina . Boiss.,Fl.Or.,i,614 (1867);Rohrb.,Monogr.Sil., 207 (1868)-Bot.Mag.,t.1997;M.Bieb.,Cent.Pl.rar. Ross.,t.3 (1810).

Syn. S.depressa Ledeb.,Fl.Alt.,ii,151 (1830);non Ledeb.,Fl. Ross. (1842);non Biv.(1814);non M.B.(1808); non Bmg.

S.oligantha Besser herb.ex Rohrb.,Monogr.Sil.,208(1868); non Boiss. & Heldr.(1853).

S.repens var.macilenta Bunge,Suppl.Fl.Alt.,32 (1836).

S.litigiosa Schrenk in Bull.Phys.Math.de l'Acad de St. Petersb.,11.198(1844).

S.supina var. genuina Rohrb.,Monogr.Sil.,207 (1868).

Plants 15.0 -40.0 cm. tall,puberulent,becoming glandular-puberulent above.Leaves 2.0-4.0 X 0.25-0.3 cm.,linear or linear-

lanceolate,acute,puberulent,rarely grey with dense hairs.Cymules strict,few-flowered.Calyx 1.7- 2.3 cm.long,glandular-puberulent, sometimes sparingly hirtellous.Petal white;claw conspicuously exserted,smooth,seldom ciliate.Capsule 8.0-10.0 X 3.0-4.5 mm., 1-1½ times as long as anthophore.

Type- In promontorii Caucasici Saxosis,circa thermas constantinomon--tanas frequens,M.Bieb.

TURKEY- Prov.Kars/Agri:Agri dag,Ghilan,Aucher 4224.

IRAN- Aderbidjan,Aucher 4225 ;10m. E.of Zorah,1200m.,15-6-1929 Cow. & Darl. 1790.

Habitat- On mountains;alt.- 1200m & above..

ii. subsp. pruinosa (Boiss) Chowdhuri,stat.nov.

Plants 15.0-49.0 cm.tall,grey,retrorsely & densely puberulent,often tomentulose or hirtellous.Leaves 1.0-2.3 cm.long, 0.8-2.5 mm.wide,linear-lanceolate or linear-spathulate,usually slightly curved,generally puberulent like the stem.Cymules strict, 3-5 (7)-flowered.Calyx (0.9) 1.1-1.5 cm.long,glandular-puberulent and viscid,with greenish or pinkish nerves.Petal white or pinkish or reddish;claw more or less exserted,smooth or ciliate. Capsule 6.0-8.0 X 3.5-4.0 mm,1-2 times as long as anthophore .

a. var. pruinosa .

Syn. S.pruinosa Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,23 (1842).
S.spergulifolia Griseb.,Spicil.,i,174 (1843);non M.B.(1819); non Schur (1853).

S.involuta Forsk.,Fl.Aeg-Arab.,Suppl.,210 (1775) species dubia .

S.virgata Stapf in Denkschr.Akad.Wien,li,283 (1886).

S.supina var.pruinosa (Boiss.) Rohrb.,Monogr.Sil.,208(1868).

S.pruinosa var.macrocalyx Bornm. & Freyn in Osterr.Bot. Zeitsch. 400 (1890).

Plants tall,erect or ascending,many-flowered .

Type- In Syria prope Antab et Cappadocia ad Euphratem,Aucher 480 & 458 [holo.G.;iso.K',BM'.]

Widespread in Turkey. Selected specimens: (leave ½ page when typing)

TURKEY- Armenia,June1834,Montb..Prov.Elazig:Haeput at Muradlii, 1-6-1889,Sint.666. Prov.Ankara: Bergsteppe,13-5-1932,Kotte ; Zirrat Meklebi,Muller 289;Kawakli dere opp. Ankara,900m., 13-7-1929,Bornm.13338 .Prov. Kastamonu:Tosya above town,30-6-1892, Sint.4224 & 4224b .Prov.Cankiri :Cankiri,800m.,16-6-1929,Bornm. 13336;ibid.Bornm.13337 .Prov.Amasya:Kleinasien,Manissad. Prov. Erzincan:Erzincan,3-7-1940,Bagda .Cappadocica,Uber Baaden,1800-1900m, 16-6-1898,Siehe 128 .Prov.Kayseri:Kisge,W.foot of Bakir dag, 1300m.,Davis 19222.

Prov.Gaziantep:Gaziantep,3-6-1882,Post259 ;vill.Harumiji (Amanus)3-500m.,June 1911,Harad.3557;Gaziantep,May-June,1834, Montb.1878.Prov.Maras:sine loco,3-9-1884,Post .Prov.Hatay:Nur daglari above Arsus,1500m.,5-7-1862,Ky.145 .Prov.Mersin:nr.Mersin Siehe 533.Cilician Taurus,a1836,Ky.74 ;ibid.Aucher ;vill.Gulek Boghas,26-6-1855,Bal.797;ibid.Siehe 453;ibid. Peronin 168 .Prov. Nigde:Pertek,1400m.,June 1913,Siehe 589 .Prov.Konya:Konya,1600m., June 1912,Siehe 454 ;Sultan dag nr.Akshir,1100m.,16-6-1899, Bornm.4171 ;ibid.10-1200m.,21-6-1899,Bornm.4169 ;between Beyschir & Konya,June 1845,Heldr..Prov.Antalya:Elmali,Mt.Ali dag,30-6-1883, Pichler ;Elmali,18-5-1860,Bourg.53;dt.Gebiz (Pisidia)Bozburun dag, between Bogaz Azze & Tozlu Cukur yayla,1500m.,27-7-1948,Davis 15567.Katana Pass,Forbes 145. Prov.Mugla:Sandras dag nr.Gokce Ova, 1700m.,23-7-1947,Davis 13494 .Prov.Burdur: nr. Burdur,May 1845, Heldr..Lydia June 1842,Boiss..Caria,Aucher 486;ibid.a1843,Pinard. Prov.Bursa:Ulu dag,31-7-1944,Basar..

SYRIA- Between Aleppo & Malatia,June 1834,Montb.

IRAN- Mt.Elwend,a1882,Polak;Ecbatanensi,a1882,Polak.

b. var. alpina Boiss.,Fl.Or.,i,613 (1867);Post,Fl.Syr.Pal.& Sinai,ed.2 i,183 (1932).

Plants dwarf,procumbent,few-flowered,sometimes 1-2-flowered

Type- Turkey-in regione alpina Tauri Cilicici alt.8000'-9000', Bal.& Ky. and monte Beryt dagh Cataoniae [holo.G]

TURKEY- Prov.Mugla:Girdev dag,2000m.,5-8-1947,Davis ;Sandras dag,23-7-1947,Davis 13541.Prov.Antalya : Takhtali dag (Kener), 2100m.,16-8-1947,Davis 14139 ;ibid. 16-8-1947,Davis 14198 Bolkar daglari (Cilicia) Bal.

Habitat-Grows at high altitudes - alt.-2000m or above.

c. var. rubra Gilliat-Smith in Kew Bull.(1930),309.

Plants dwarf.Calyx with pinkish or reddish nerves . Petal red.

Type- Hills south of Tabriz,5-6-1928,Gilliat-Smith 2320[holo.K'.]

IRAN- Locus classicus,5-6-1928,Gilliat-Smith 1630;nr. Tabriz, a 1927,Gilliat-Smith 1848 ;ibid.a1927,Gilliat-Smith 1845 & 1846 &1849.

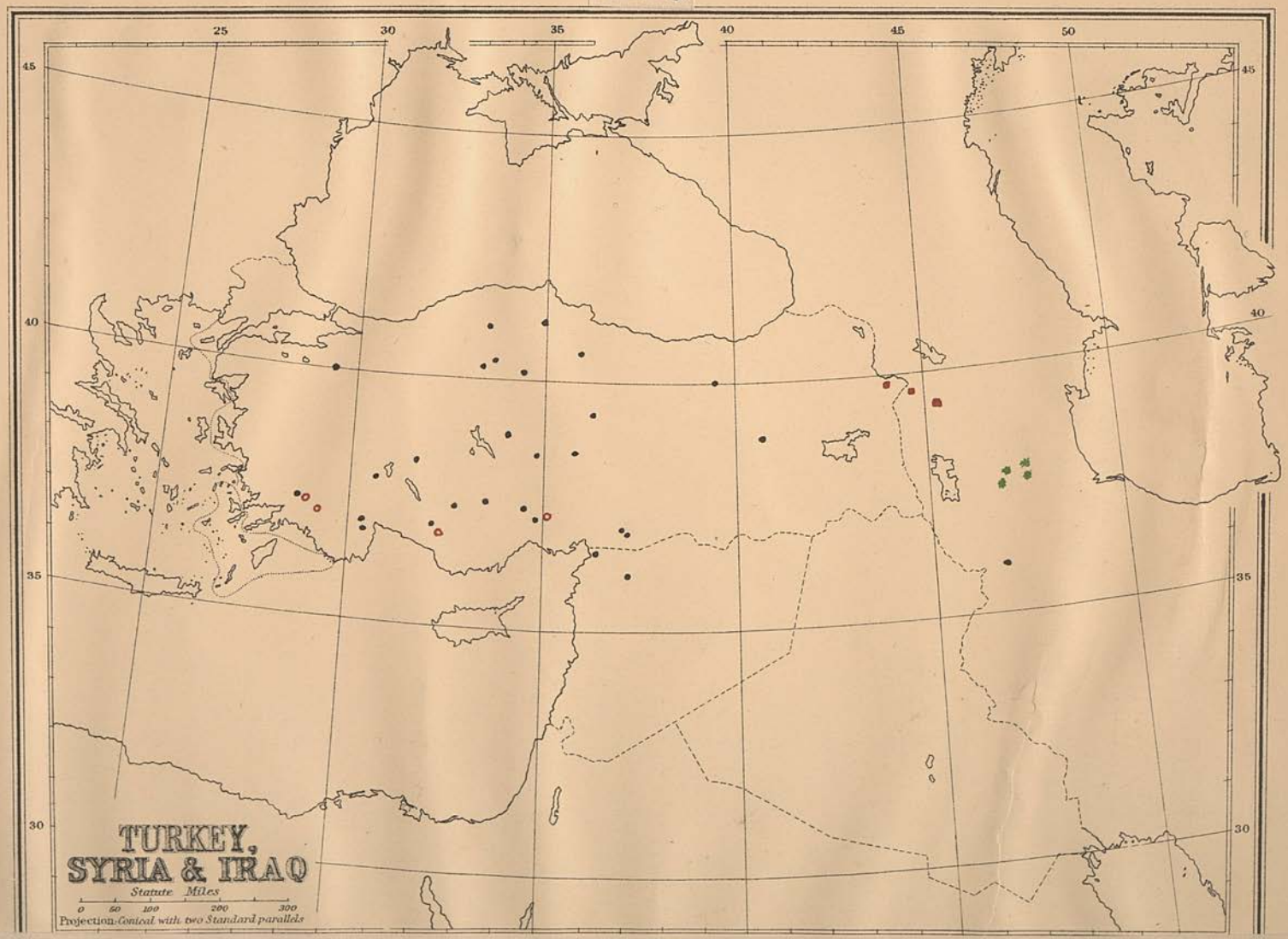
S.supina resembles S.Montbretiana Boiss. var. microphylla Boiss. & S.spergulifolia (Desf.)M.B. in the general habit and type of inflorescence,but the plants of S.supina are easily distinguished from the former by the nature and type of indumentum,particularly of the calyx,shape and degree of incision of the lamina.From S.spergulifolia it is sharply set off by the shape of leaves which are not usually fasciculate,calyx long but not atall inflated,nature and density of indumentum and the relative length of capsule and anthophore.

In habit & shape of calyx it resembles S.brahuicaBoiss., as has been pointed out under that species.

Most taxonomists have preferred to keep S.supina and S.pruinosa as distinct species.Boissier,Williams,Post and Schischkin are some of the taxonomists who maintained S.supina and S.pruinosa as separate species.Boissier,while discussing the difference between them,stated "A spergulifolia et S,pruinosa calyce 7''' longo statim distinguenda ".Except for this difference in the length of calyx,and consequently in the length of petal,anthophore and capsule,there seems to be no other morphological character separating them.This difference in the size of the flowers does not justify treating these taxa as separate species.In the Orient they occupy,to some extent, separate areas;therefore following Rohrbach,I have retained them under one species (S.supina) but have accorded them subspecific rank within it.

Of these two subspecies,subsp. pruinosa occupies a wide area in the Oriental countries,and being highly polymorphic has developed 3 more or less distinct forms showing geographical or ecological separation,which have been treated here as varieties.The var.pruinosa occurs throughout Turkey,and extends upto Iran and Syria; the var. alpina occupies the Mediterranean region of Turkey,growing at higher altitudes than the typical variety;the var. rubra is restricted to the environs of Tabriz in Iran [Their distribution has been shown in the accompaning map-Map 3].

MAP 3



Map 3.Distribution of Silene supina.

Subsp.supina-■ ::Subsp.pruinosa var.pruinosa-● :Subsp.pruinosa var.alpina-O :

Subsp.pruinosa var.rubra-* .

48. S.brahuica Boiss.,Fl.Or.,i,615 (1867);Rohrb.,Monogr.Sil.,192(1868).

Perennial,18.0-35.5 cm.tall.Root heavy,vertical,woody, with a multicipital crown.Caudex erect or ascending,slender, becoming branched and suffruticose,often covered with bases of old leaves.Stem erect or arcuately erect,terete,leafy,usually simple below,becoming branched from the middle upwards,branches alternate or opposite,canescent,tomentulose,becoming sparsely glandular above especially in the region of inflorescence;nodes swollen;middle internodes 2.3-5.5 cm.long.Leaves monomorphic, often fasciculate,1.6-4.5 cm.long,1.0-3.0 mm.wide,linear-lanceolate to linear,sometimes linear-subulate,more or less tomentulose;lower ones petiolate,base with hyaline ciliate margin;middle & upper leaves sessile and conspicuous.Inflorescence a panicle;cymules alternate or opposite,1-3-flowered,ascending. Bracts equal,linear-lanceolate,with narrow hyaline ciliate margin. Pedicels 1.5-13.0 mm.long,erect.Flowers hermaphrodite.Calyx 1.2-1.5 cm.long,2.8-3.3 mm.diam.,cylindrical,umbilicate,with 10 more or less anastomosed nerves,glandular-puberulent & hirtellous,in fruit clavate with base narrowed below the capsule; teeth 1.5-2.0 X 1.3-1.5 mm.,ovate,obtuse,often round,with hyaline ciliate margin.Petal 1.1-1.5 cm.long;claw 7.0-8.5 mm.long equaling calyx,smooth;auricles minute or absent;limb 3.5-6.5 X 2.3-3.0 mm., oblong,bipartite into oblong-linear lobes;ligules two,0.8-1.0 mm. long,ovate,obtuse.Filaments exserted,smooth .Styles 3,exser ted more or less hairy.Anthophore 5.0-7.0 mm.long,hairy.Capsule 6.0-7.5 X 3.0-3.5 mm.,ovoid,as long as or somewhst longer than anthophore.Seed dark brown,0.8-1.0 mm.long,with flat face & grooved back,granulate.Ch.

Type- In Affghania ad Choky (Griff.) in Belutschia prope Doubund (Stocks) [holo.G.;iso. K'.]

AFGHANISTAN- sine loco,Griff.488.

BALUCHISTAN- Urak (Usak) 2100m.,3-5-1890,Lace 3730 ;Gival, 1800m.,27-4-1888,Lace 3730 ;Zarghum,2190m.,30-4-1888,Lace 3730.

Geogr. Endemic to the countries cited above.

Habitat- On mountains;alt.-1800-2190m..Fl.-May & June.

S.brahuica resembles S.supina M.B. in general habit, inflorescence,shape of calyx,but is set off from the latter by the leaves which are usually fasciculate and generally subulate,and the lamina which is oblong.It also shows some resemblances to S.spergulifolia (Desf.)M.B.,particularly in the shape and fasciculation of leaves and inflorescence,but is easily distinguished from the latter by its narrow and long calyces that are not inflated at all,smooth petal having an oblong limb,and relative length of capsule and anthophore.

49. S.Montbretiana Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,26 (1842);Boiss., Fl.Or.,i,614 (1867);Rohrb.,Monogr.Sil.,192(1868); Post,Fl.Syr.Pal.& Sinai,ed.2.i,183 (1932).-Plate 7.

Syn. S.supina var.latifolia Hohen. en Talysch 162.
S?Hohenackeri Boiss.,Diagn.Pl.Nov.Or.,Ser.11,i,75 (1859).
S.ispirensis Boiss.& Huet,Diagn. 11.v,55 (1856).
S.Montbretiana var.kurdica Boiss.& Noe,ibid.
S.Aucheriana Boiss.,Fl.Or.,i,617(1867);non Boiss.,Diagn. Pl.Nov.Or.,Ser.1.i,27 (1842).

S.Aucheriana var. viscosa Freyn & Sint. in Oestr.Bot Zeitsch.,xli,364 (1891).

Perennial 13.0-57.0 cm.tall.Caudex ascnding or erect, sometimes more or less prostrate,becoming branched & suffruticose, old portin naked,while young porting covered with bases of old leaves.Stem terete,erect,often arcuate at the base,simple below, becoming branched above,sometimes branched throughout,branches usually alternate,stiff,grey valvety with dense somewhat retrorse hairs,often tomentulose,sometimes rough due to presence of short hairs, becoming glandular and more or less viscid above;middle internodes 4.5-9.3 cm.long. Caudical & lower cauline leaves rosulate,petiolate,3.2-7.5 cm.long,2.0-7.5 mm.wide,linear-lanceolate or lanceolate,attenuated into petiole,obtuse or nearly so,hirsute or hispidulous;other cauline leaves sessile,1.5-5.2 cm.long, 2.5-9.0 mm.wide,oblanceolate,lanceolate or oblong-lanceolate, sometimes ovate-triangular,seldom ovate,more or less hirtellous & glandular;all leaves 1-nerved,straight or slightly curved,base with hyaline ciliate margin.Inflorescence a panicle;cymules usually alternate,sometimes opposite,1-3-flowered.Bracts equal,ovate, acuminate ,or lanceolate acute,with membraneous ciliate margin. Pedicels of terminal flowers 7.0-18.0 mm.long & those of lateral ones 2.0-5.0 mm.long,erect or ascending.Flowers hermaphrodite , sometimes pistillate with aborted stamens,erect.Calyx 1.0-1.5(1.7) cm.long,3.5-5.5 mm.diam.,clavate or cylindrical-clavate,with 10 prominent pinkish anastomosed nerves,glandular-puberulent & viscid, sometimes hirtellous,in fruit clavate,often slightly inflated, base truncate-umbilicate;teeth 1.0-2.3 X 1.0-2.0 mm.,ovate,obtuse

Plate 7

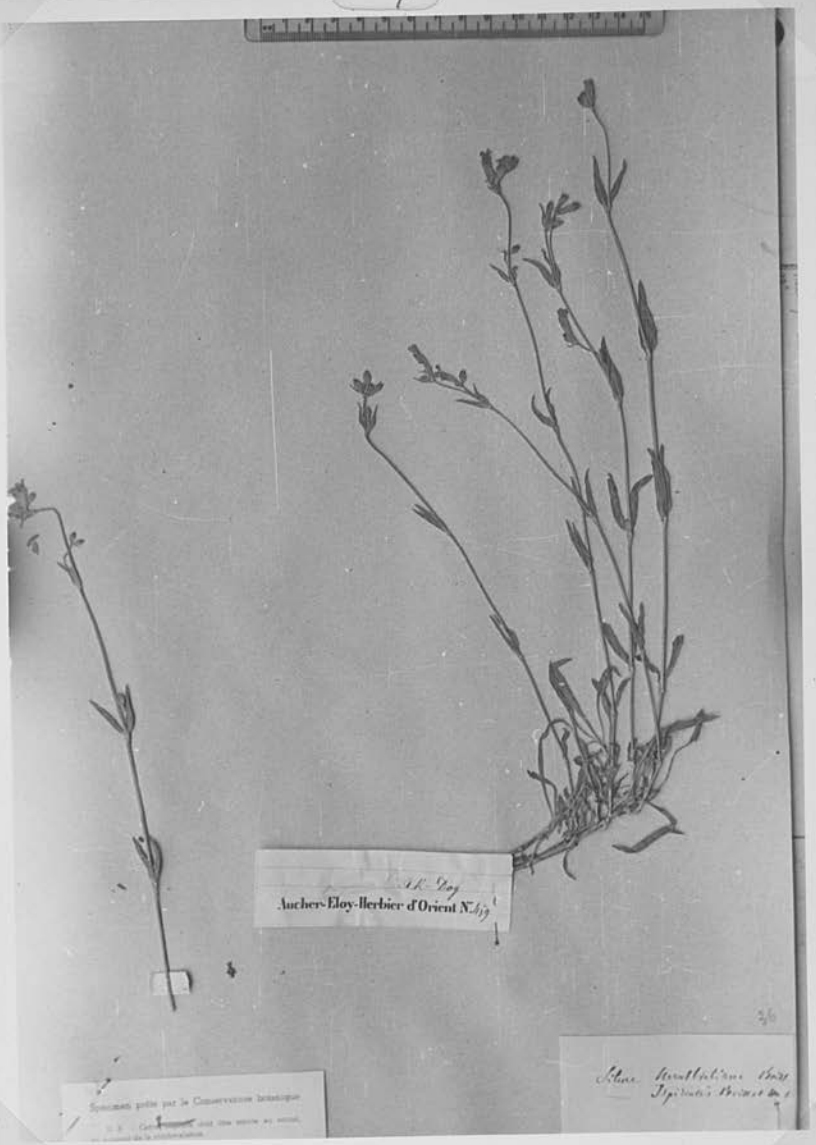


Plate 7-Silene Montbretiana Boiss.

or round,with hyaline ciliate margin.Petal white,yellowish, or pinkish,1.2-1.6 cm.long;claw 8.0-10.0 mm.long,equaling calyx, smooth;auricles obtuse,acute,sometimes round,seldom true auricles obscure;limb 4.0-6.0 X 2.3-5.0 mm.,oblong-obovate,bipartite into obovate lobes;ligules two,0.8-1.3 mm.long,oblong,obtuse, round or crenulate.Filaments equaling claw,smooth.Styles 3 (3-5), exserted,hairy.Anthophore 3.0-7.0 mm.long,hairy.Capsule 7.0-12.0 X 4.0-5.0 mm.,oblong,as long as or slightly longer than anthophore,included.Seed brown,0.7-1.3 mm.long,with flat face & grooved back,tuberculate.Ch.

Type- " In monte Ak dagh [Turkey] Aucher 459 "? probably cited by confusion instead of: in Persia in montibus Dalmkou,Aucher 4208.[holo.G.;iso. K'.]

TURKEY- Prov.Erzerum: Mts. between Erzerum & Ispir,5-6000m.,June 1853,Huet ; nr. Ispir,June1853,Huet ;Ispir,8-8-1862,Bourg.45; Erzerum,Zohrab 158 . Prov.Gumusane :between Gumusane & Bayburt, 18-6-1862,Bourg.48; Gumusane nr.Fshavros,9-8-1889,Sint.1721; Bayburt,17-6-1862,Bourg.44 & 46;Gumusane,Aghakoei,20-6-1894, Sint.5945. Prov.Erzincan: Kemaliye,Deliklusaset,26-6-1889, Sint.952;Kemaliye,Yokardi dag,6-6-1890,Sint.2493;Kemaliye, Szanduk,26-5-1890,Sint.2386 .Prov.Van:between Van & Ischri, yr.1849,Noe 168.

IRAQ- Pir Omar Gudrum,June 1867,Hausskn. ;ibid. above Qarachitan 12-1600m.,19-4-1947,Gillett 7770;ibid. 19-4-1947,Gillett 7769 ; ibid. 2000m.,7-6-1948,Rawi 12080;Sefin dag above Erbil,1400m., 9-5-1947,Gillett 8165; Khantur,1800m.,15-5-1947,Rawi 8789; Matina,2000m.,15-5-1947,Rawi 8684; Kodo nr.Hagi Omran,2500m., 22-6-1947,Rawi 9197;ibid.2800m., 22-6-1947,Rawi 9220.

IRAN- Mt.Elbrus,2400m.,July 1867,Hausskn.203 ;Kandawan,2700m., 26-5-1937,Rechinger 491;Pic Kuh,1600-2200m.,30-5-1937,Rechinger578; ibid. 30-5-1937,Rechinger 576;nr.Derband,27-5-1843,Ky.207 & 273 Passgala,8-6-1843,Ky.273a; Totschal,2700m.,4-6-1902,Bornm.6390; Totschal vall.Scheheristanek,2200m.,7-6-1902,Bornm.6392 ;Mt.Elwent, May 1902,Bornm. ;ibid. 15-5-1895,Hausskn.26 ;ibid. Polak.Sultanbad, sine loco,21-5-1890,Strauss. ;Kuh Sefin,1800m.,21-5-1893,Bornm.979; Tang nr.Abdin,17-5-1885,Stapf 1309 ;2m. W.of Ushnu,1950m.,30-5-1929 Cow. & Darl.1416; above Zindjanab Sahend range,25-6-1929,Gilliat-

Smith 2521.

Geogr. Endemic to Turkey,Iraq,Iran & Caucasus.

Habitat- On lime stone & mountain slopes;alt.-1200-3500m.

Fl.- April- Sept.

S.Montbretiana Boiss.,Diagn.,Ser.1.i,26 (1842) was originally based on a specimen of Aucher's ,number 459 with the habitat " Ak dagh ".A specimen with this designation is in the Kew Herbarium, & I think it is identical with that on which Boissier based his description of S.Montbretiana.On the following page,Boissier described S.Aucheriana from a specimen collected " in montibus Ellwind et Dalmkou [Persia] -Aucher no. 459,459 bis et ter,4208 ". 4208 refers to the plant from Dalmkou,which is in the Kew Herbarium, and agrees obsolutely with the plant mentioned above bearing the label " Ak dagh,459 ".It is very strange that a plant of Aucher's numbered 459,459 (bis) & 459 (ter), provided with an original label from Montbret and collected on the Ak dagh (Taur. Or.) is nothing but Fenzl's S.arguta which was originally based on a plant collected by Kotschy from the same locality.Rohrbach,as well as Boissier,mention in their works that they have seen Aucher 459 and confess that it is true S.arguta [vide Rohrb.,Monogr.Sil.,135 (1868) & Boiss.,Fl.Or., i,618 (1867)].It is,therefore,evident that some thorough confusion was made in distributing the plants.

I would prefer to interpret the matter in the following way- Aucher and Montbret collected a plant on the Ak dagh,in the eastern Taurus and numbered it 459,459 (bis) & 459 (ter).This plant is S.arguta Fenzl,which was collected later on by

Haussknecht in the very same mountain range,on the Beryt dagh. In the same year (1842) Boissier published a description of his S.Aucheriana which perfectly fits S.arguta,and indeed quotes Aucher 459,459 bis & 459 ter .But by some mistake he indicates the locality as " Ellwind " [in Persia],and at the same time combines with it a plant from Dalmkou (Aucher 4208).This latter plant,however,is a different species (S.Montbretiana).In his Fl.Or.,i,617 (1867),Boissier altered his description so as to make it fit the Dalmkou plant,and omits the habitat "Ellwind" altogether,along with Aucher 459,459 bis & 459 ter .But the Dalmkou plant was,I am convinced,also distributed under the number 459 and bearing the locality " Ak dagh";this specimen formed the basis for S.Montbretiana Boiss. and is therefore to be maintained for the plant from Dalmkou and " S.Aucheriana " of Boiss.,Fl.Or. (non Diagn.) has to be sunk under it;whilst the true S.Aucheriana Boiss. (Diagn.) goes as a synonym of S.arguta Fenzl.In Fl.Or.,i,614,S.Montbretiana appears very widened.It comprises the type specimen from Dalmkou (erroneously indicated from Ak dagh),S.ispirensis Boiss.& Huet.(Diagn.Ser.ll. v,55) to which specimens from the northern Armenia (collected by Huet and Bourgean) belong,and a specimen from Aintab collected Haussknecht.This specimen of Haussknecht's I have not seen,but from the description it appears to be intermediate between S.Montbretiana and S.supina.Boissier also quotes a specimen from the Soff dagh (collected by Haussknecht)which I have not seen at Kew. S. Montbretiana occurs in Turkey, Iraq, Iran and the Caucasus

50. S.eriocalycina Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,28 (1842); Boiss.,Fl.Or.,i,615 (1867);Rohrb.,Monogr.Sil., 190 (1868). - Plate 8.

Perennial,15.0-30.0 cm.tall.Caudices several from the crown,erect or arcuate,5.0-23.0 cm.long,2.0-7.0 mm.wide,becoming branched and suffruticose,young portion covered with bases of old leaves.Stem erect,terete,greenish,often purplish from the base upwards,simple or branched,densely retrorse-puberulent, and more or less hirtellous;branches strict,ascending or erect. Caudical and lower cauline leaves rosulate,petolate,3.6-7.0 cm. long,2.5-8.0 mm.wide,oblong- to linear-lanceolate,attenuated into petiole,base with hyaline ciliate margin;other cauline leaves sessile,or subsessile,1.3-5.7 cm.long,1.5-8.0 mm.wide, lanceolate or linear,sometimes oblanceolate;all leaves actue, puberulent.Inflorescence a panicle,often passing into a simple or compound dichasium.Bracts & bracteoles subequal,linear-lanceolate to linear,with hyaline ciliate margin towards the base.Pedicels of terminal flowers 7.0-9.0 mm.long,and those of lateral flowers 1.5-1.8 cm.long.Flowers hermaphrodite,erect.Calyx 1.5-1.8 cm.long,3.3-5.0 mm.diam.,clavate,umbilicate,with 10 anastomosed nerves,scabrous-papillose or more or less hirtellous; teeth 2,5-3.0 X 1.8-2.3 mm.,lanceolate or ovate-lanceolate,often with constricted base,acute or nearly so,with hyaline ciliate margin.Petal 1.3-2.0 cm.long;claw 7.0-11.0 mm.long,more or less exceeding calyx,smooth;auricles minute or obscure;limb 6.0-9.0 X 2.3-3.5 mm.,oblong-cuneate,bipartite to the middle into oblong lobes;ligules two,0.8-1.3 mm.long,oblong,obtuse. Filaments equaling claw,smooth. Styles 3,included,smooth.

Plate

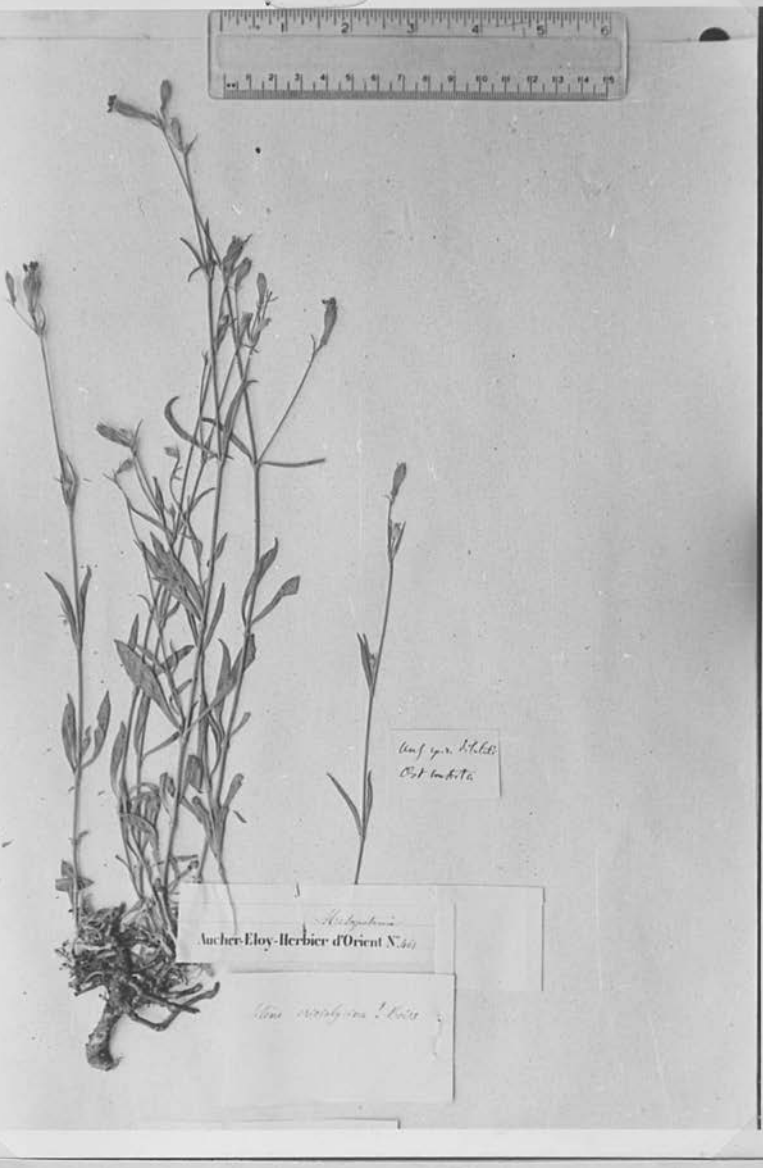


Plate 8-Silene eriocalycina Boiss.

Anthophore 7.0-8.0 mm.long,scabrous.Capsule 8.0-9.0 X 4.5-6.0 mm., oblong,as long as anthophore,included.Seed brown,1.3-1.5 mm.long, with flat face & obtusely grooved back,tuberculate.Ch.

Type- In Mesopotamia, Aucher 461 [holo. G.]

IRAQ- Riwandanus,in Mt.Sakri-Sakran,2000m.,23-6-1893,Bornm.980.

Geogr. Endemic to Iraq.

Habitat- On mountains;alt.-2000m..Fl.-June & July.

S.eriocalycina is most closely related to S.Montbretiana Boiss..It is almost identical with that species in caudex character,leaf form,habit,inflorescence and in the shape of calyx,but differs in having eglandular hairs of different nature and density,lanceolate acute calyx teeth,and petal with an oblong-cuneate limb.

51. S.hirticalyx Boiss. et.Hausskn. in Boiss.,Fl.Or.,Suppl.,104 (1888);Williams in Journ.Linn.Soc.,xxxii,148 (1896).

Perennial,25.0-35.0 cm.tall.Caudex slender,ascending,sometimes erect,woody,branched,often covered with bases of old leaves.Stem erect or ascending,sometimes arcuate at the base,terete,leafy, simple below,branched above,sometimes branched throughout, glabrous and more or less glaucescent,sometimes scabrous below; middle internodes 3.7-5.0 cm.long.Caudical and lower cauline leaves rosulate,petiolate,3.4-7.0 cm.long,2.5-5.0 mm.wide, lanceolate,attenuated into petiole,base with hyaline ciliate margin,obtuse or nearly so,glabrous,sometimes scabrous;other cauline leaves sessile,2.5-4.0 cm.long,3.0-6.0 mm.wide,oblong-

to linear-lanceolate,acute,glabrous,sparingly ciliate at the base;all leaves 3-nerved at the base.Inflorescence a panicle; cymules 1-2-flowered.Bracts & bracteoles equal,lanceolate or ovate-lanceolate,acuminate,3-nerved,ciliate,with the pedicels puberulent.Pedicels of terminal flowers 3.0-6.0 mm.long,and those of lateral flowers 1.2-2.1 cm.long.Flowers hermaphrodite, erect.Calyx 2.0-2.3 cm.long,3.5-4.0 mm.diam.,cylindrical with tapering base,truncate-umbilicate,with 10 purplish anastomosed nerves,valvety with white crisp hairs,in fruit clavate;teeth 1.3-1.8 X 1.5-2.0 mm.,unequal,ovate,obtuse or round,with wide hyaline ciliate margin.Petal dark purple,1.6-1.83 cm.long;claw 1.0-1.1 cm.long,equaling calyx,smooth;auricles minute,sometimes onscure;limb 6.0-7.3 X 3.5-4.3 mm.,cuneate,bipartite into oblong lobes;ligules two,1.0-1.3 mm.long,oblong,denticulate.Filaments included,smooth.Styles 3,included,smooth.Anthophore 6.5-8.3 mm. long,scabrous.Capsule 9.5-11.0 X 4.0-5.0 mm.,oblong,as long as or somewhat longer than anthophore,included.Seed dark brown, 1.5-1.8 mm.long,with flat face and flat or concave back.Ch.

Type- In montibus Kurdistaniae Persiae supra Juarno ad nives, 12000',Hausskn. [holo.G.;iso.K'.]

IRAN- Kurdistan-Schahu,3000m.,July 1867,Hausskn.202.

Geogr. Endemic to N. Iran.

Habitat- On mountains;alt.- 3000m..Fl.- July.

S.hirticalyx is closest to S.persica Boiss..The 2 species are similar in habit,nature of caudex,leaf shape and inflorescence,but they differ greatly in indumentum,shape of calyx,shape & colour of petal;in S.hirticalyx the plant is

glabrous and glaucescent,calyx cylindrical with narrow base, & petal pink coloured with cuneate limb.Boissier referred to its close similarity with S.swertiifolia Boiss. & S. makmeliana of the section Sclerocalycinae,but except for its glabrous habit with glaucous bloom it has no other similarity to members of Sclerocalycinae .

52. S.persica Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,27 (1842).

Perennial, 4.0 -32.5 cm tall,caespitose.Caudex slender elongated upto 13.0 cm.,erect or ascending,branched,young portion with marcescent shreds of old petioles.Stem erect,ascending, or arcuately erect,slender,terete,more or less rigid,simple below,more or less branched above,puberulent,becoming sparingly glandular above;middle internodes 1.5-6.7 cm.long.Caudical & lower cauline leaves rosulate,petiolate,2.2-8.0 cm.long,1.5-9.0 mm.wide,lanceolate,linear-lanceolate or linear,attenuated into petiole,slightly curved,base with hyaline ciliate margin,acute or obtuse;other cauline leaves sessile,1.4-5.3 cm.long,1.5-6.3 mm.wide,linear-lanceolate or linear,seldom lanceolate,acute; all leaves retrorsely puberulent.Inflorescence a dichasial cyme, often a panicle of few flowers.Bracts unequal,linear-lanceolate, acute,with ciliate margin.Pedicels of terminal flowers 5.0-30.0 mm.long,& those of lateral flowers 5.0-8.5 cm.long,erect. Flowers hermaphrodite,sometimes pistillate with aborted stamens, erect.Calyx 1.7-2.9 cm.long,3.0-4.5 mm.diam., cylindrical-clavate, or clavate,truncate-umbilicate,with 10 usually pinkish anastomosed nerves,puberulent,more or less hirtellous & glandular,in fruit always clavate with a slightly constricted base;teeth 2.5-3.0 X

1.8-2.5 mm., triangular or lanceolate,seldom ovate,with hyaline scarious margin.Petal greenish white to dirty pink,1.3-1.9 cm. lomg;claw 8.0-10.0 mm.long,equaling calyx or slightly exserted, smooth;auricles acute,obtuse,or erose-denticulate;limb 5.0-9.0 X 2.5-5.0 mm.,oblong with cuneate base,bipartite to the middle into oblong obtuse lobes;ligules two,1.0-1.5 mm.long,truncate, obtuse or denticulate,sometimes oblique.Filaments exserted,smooth. Styles 3,exserted,hairy.Anthophore 7.0-13.0 mm.long,smooth . Capsule 8.0-12.0 X 3.0-4.5 mm., oblong,as long as anthophore, included.Seed dark brown,0.8-1.3 mm.long,with flat tuberculate face & grooved granulate back.Ch. or Hs.

Key to the subspecies and varieties.

Plants retrorsely puberulent,often hirtellous,not glandular at all; calyx 1.7-2.1 cm.long,puberulent and hirtellous;capsule 8.0-9.5 mm.long .....i.subsp. persica

P lants (8.7) 10.0-25.0 cm.tall;cauline leaves 2.5-6.3 mm.wide, lanceolate to linear-lanceolate;calyx 1.6-1.8 cm.long .....a.var.persica

Plants 4.0-10.0 cm.tall;cauline leaves 2.0-2.5 mm.wide,linear-lanceolate to linear;calyx 2.1-2.3 cm.long .....b.var. angistoma

Plants retrorsely puberulent,becoming glandular and hirtellous above;calyx (2.1) 2.3-2.9 cm.long,glandular-puberulent & more or less hirtellous;capsule 9.0-13.0 mm.long .....ii.subsp.Moorcroftiana

i. subsp. persica .

Plants 4.3-23.5 cm.tall,caespitose,densely retrorse-puberulent. Caudex 2.0-7.0 cm.long,1.5-7.0 mm.wide,branched.Stem sparingly branched from the middle upwards.Caudical & lower cauline leaves 2.3-4.7 cm.long,2.0-5.0 mm.wide,linear-lanceolate to linear; other cauline leaves 1.4-3.3 cm.long,2.5-6.3 mm.wide,lanceolate to linear-lanceolate.Pedicels of terminal flowers 3.0-6.0 mm. long,& those of lateral flowers 7.0-13.0 mm.long.Calyx 1.7-2.3 mm.long,pubescent & hirtellous,seldom sparingly glandular.Petal white,1.4-1.6 cm.long;limb 5.5-6.3 X 3.0-3.5 mm.,Capsule 8.0-9.5 X 4.5-5.0 mm.,as long as or 1½ times longer than anthophore. Seed 0.9-1.3 mm.long.

a. var. persica . Boiss.,Fl.Or.,i,622 (1867);Rohrb.,Monogr.Sil., 129 (1868). Plate 9.

Plants (8.7) 10.0-25.0 cm.tall.Cauline leaves 2.5-6.3 mm. wide,lanceolate,sometimes linear-lanceolate.Calyx 1.6-1.8 cm. long.

Type- In persia ad Ispahan,Aucher 431 [holo.G'.;iso.K'.,BM'.]

IRAN- Kurdistan,Sawers,3600m.,July 1868,Hausskn.;Nur, Hausskn.; Kellal Sebsekuh,3000m.,Sept.1868,Hausskn.;Ecbatanense,a1882, Polak ;Bakhtiari,(S.W.Iran) Sawyer 13041.

b. var. angistoma (Fenzl) Boiss.,Fl.Or.,i,622 (1867);Williams in Journ.Linn.Soc.,xxxii,85 (1896).

Syn. S.angistoma Fenzl in Ky.Pl.Pers.austr. 1845 ms. Plants 4.0-10.0cm.tall.Cauline leaves 2.0-2.5 mm.wide,linear, sometimes linear-lanceolate.Calyx 2.0-2.1 cm.long.

Plate

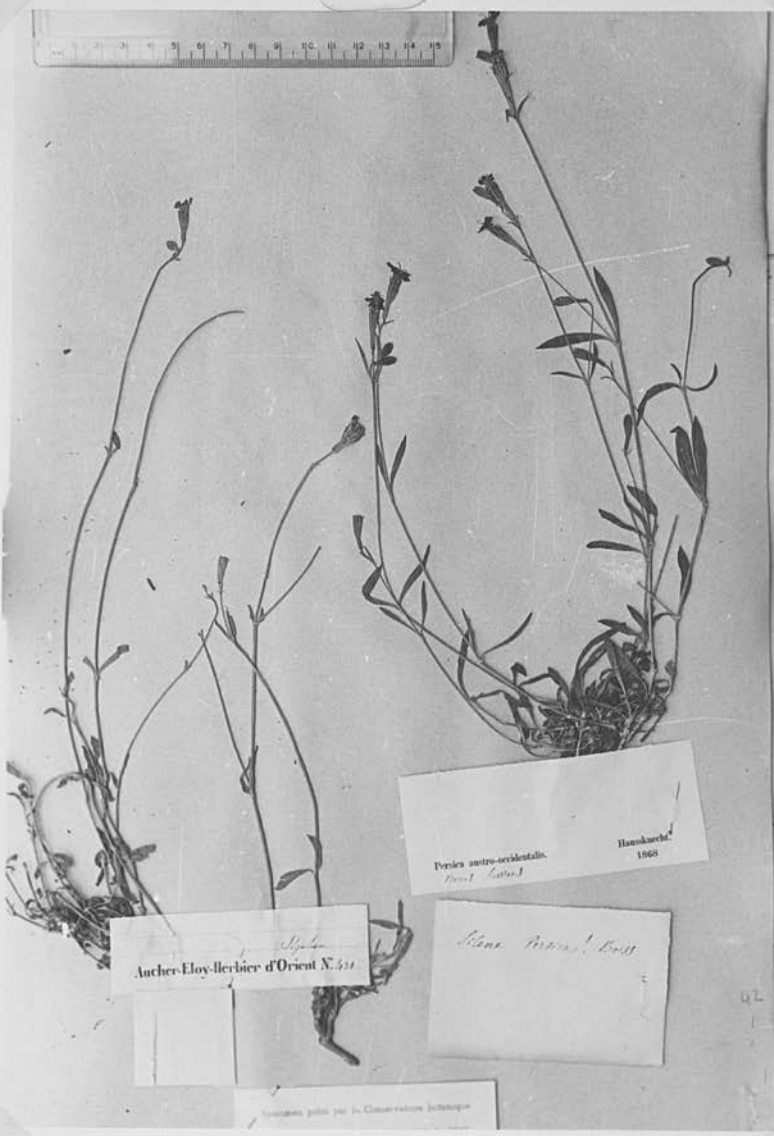


Plate 9-Silene persica Boiss.

Type- In monte Kuh Daena Persiae australis,Ky.732[holo.G.;iso.K'., BM'.]

ex Rohrb.

ii. subsp. Moorcroftiana (Wall.) Chowdhuri, comb. et stat.nov. - Blatter,Beaut.Fl.Kashm.,i,t.14,fig.2 (1928).

Syn. S.Moorcroftiana Wall.Cat.,626 (1828).

Plants 4.0-32.5 cm.tall,caespitose,densely retrorse-puberulent,becoming glandular above,sometimes upper part hirtellous. Caudex 3.0-13.0 cm.long,2.0-4.5 mm.wide,branched.Stem sparingly branched above.Caudical & lowers cauline leaves 2.2-8.0 cm.long, 2.0-7.0 mm.wide,lanceolate to linear-lanceolate;other cauline leaves 1.9-6.5 cm.long,2.3-7.0 mm.wide,lanceolate,sometimes linear-lanceolate.Pedicels 4.0-15.0 mm.long.Calyx 2.2-2.9 cm. long,glandular-puberulent,often hirtellous.Petal dirty red to white,1.3-1.9 cm.long;limb 5.0-9.0 X 2.0-4.5 mm..Capsule 9.0-13.0 X 3.0-5.0 mm.,as long as or somewhat shorter than anthophore. Seed 0.7-1.3 mm.long.

Type- In Tibet occid.,10-16000',Hook.fil. et Th.

AFGHANISTAN-Summit of Kaloo pop,Griff.1638 & 1637 & 1639;summit of Akrobet pop,2150m.,below Kaloo pop,Griff.1662 ;Safedkuh,2700-3000m.,8-8-1879,Aitch.;Paghman,2400m., 22-6-1935,Hay 252.

Geogr. (of sp.) Iran,Afghanistan,India and Tibet.

Habitat- On mountains;alt.-2700-3600m..Fl.-July-Sept.

53. S.arguta Fenzl,Pugill.Pl.Nov.Syr.,8,no.25 (1842).

Perennial,20.0-45.0 cm.tall.Root woody,vertical,with a

multicipital crown. Caudex slender, ascending, sometimes decumbent, becoming branched & suffruticose, with leaf scars on the old portion and leaf bases on the young part. Stem erect, sometimes arcuate at the base or ascending, terete, leafy, simple or branched, usually purplish from base upwards, hirtellous and puberulent with short deflexed & more or less adpressed hairs; middle internodes 2.0-8.5 cm. long. Caudical & lower cauline leaves rosulate, petiolate, 2.5-4.2 cm. long, 2.0-8.0 mm. wide, lanceolate or linear-lanceolate, sometimes oblong-lanceolate, seldom linear, base with hyaline ciliate margin; other cauline leaves sessile, like the caudical ones, 1.3-5.3 cm. long, 2.0-7.0(9.0- mm. wide; all acute, acuminate, or obtuse or nearly so, rigid, often subfalcate, dorsal surface prominently 3 (5)-nerved with oblique secondary nerves, pubescent. Inflorescence a panicle, often passing into a compound dichasial cyme; cymules alternate, strict, ascending, 3-5-flowered or only 1-2-flowered. Bracts equal, ovate, acuminate, or lanceolate acute, 3-nerved, with hyaline ciliate margin, puberulent and sparingly glandular. Pedicels 2.0-15.0 mm. long, erect or ascending. Flowers hermaphrodite, sometimes pistillate with rudimentary stamens. Calyx (0.9)1.1-2.15 cm. long, 3.0-4.3 mm. diam., cylindrical with tapering base, strongly nerved, nerves glandular-puberulent, sometimes hirtellous, glabrous or scabrous between the nerves, in fruit clavate, base truncate; teeth 1.5-3.0 X 1.3-2.0 mm., ovate, obtuse, sometimes lanceolate acute or nearly so, with hyaline ciliate margin. Petal white, 1.5-2.3 cm. long; claw 1.0-1.4 cm. long, equaling calyx, sometimes slightly exserted, smooth; auricles obtuse, acute, round, often obscure; limb 5.0-9.0 X 3.0-5.0mm., obcordate usually with cuneate base, bipartite to the middle into

obovate or oblong lobes;ligules two,0.9-1.5 mm.long,oblong, truncate,obtuse ,round or denticulate.Filaments equaling claw, smooth.Styles 3, exserted,hairy.Anthophore 3.5-6.5 mm.long, hairy.Capsule 1.1-1.5 X 0.4-0.65 cm.,oblong,3-4 times as long as anthophore,included.Seed dark brown,0.8-1.3 mm.long,with concave tuberculate face & obtusely grooved granulate back.Ch.

Key to the varieties.

Leaves,especially caudical & lower cauline ones,subfalcate; calyx strongly nerved,nerves glandular-puberulent & more or less hirtellous;teeth ovate;capsule 3 times as long as anthophore:

Stem branched from the middle upwards;branches strict,ascending, erect;cymules 3-5-flowered,congested ;calyx 1.5-2.15 cm.long .....a.var. arguta

Stem branched from the base;branches more or less divaricate; cymules 1-3 (5)-flowered,lax;calyx (0.9) 1.1-1.3 (1.5) cm.long .....b.var. armena

Leaves straight;calyx nerves not very prominent,nerves papillose; teeth oblong;capsule 3-4 times as long as anthophore .....c.var. sisianica

a. var. arguta . Boiss.,Fl.Or.,i,618 (1867);Rohrb.,Monogr.Sil., 135 (1868);Post,Fl.Syr.Pal.& Sinai,ed.2,i,183(1932)

Syn. S.pauciflora Ky. in Pl.Exs. no.83 (1836)ms.
S.arguta Fenzl (1842);non Boiss.& Bunge,Aufz.,(1860).

S.Aucheriana Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,27 (1842).

Plants branched from the middle upwards,branches ascending-erect,pubescent & hirtellous,becoming glandular above.Leaves subfalcate.Inflorescence congested,cymules 3-5-flowered.Calyx teeth ovate,obtuse.Capsule 3 times as long as anthophore.

Type- In subalpinis ac alpinis Tauri occidentalis,Ky.

TURKEY- Cappadocica:Ak dag,Aucher 2070.Prov. Maras:dt.Goksun, Binboga dag above Talak,2200-2300m.,17-7-1952,Davis 20142; Maras,1600m.,May-July 1898,Siehe 129 .Prov.Mersin: W. Bolkar daglari,Siehe 558;ibid.July 1855,Bal..Prov.Seyhan:dt.Feke,Bakir dag nr.Top of Sencan Dere,2000m.,Davis 19401 .Cilician Taurus al836,Ky.83;Bolkar daglari,Mt.Gisyl deppe,2100m.,July 1853,Ky.30 & 230a. Prov.Bitlis:Nemrut dag,2280m.,3-7-1954,Davis 23527; Suphan dag,2850m.,28-8-1954,Davis 24707. Prov.Van:Baskali,Ispiriz dag,2800m.,13-7-1954,Davis 23669. Ak dagh Aucher 459,459(bis) & 459 (ter).

IRAN- Atropatania,Meshan dag,2200m.,19-6-1924,Grossheim & Schischkin 255.

b. var. armena Boiss.,Fl.Or.,i,618 (1867);Williams in Journ.Linn. Soc.,xxxii,93 (1896).

Plants branched from the base,branches more or less divaricate or spreading,puberulent & hirtellous,becoming glandular above.Inflorescence lax;cymules few-flowered.Calyx 0.9-1.3 (1.5) cm.long;teeth ovate,obtuse.Capsule 3 times as long as anthophore.

Type- Turkey-in Armenia prope Erzeroum Huet [holo.G.,iso.K!]

TURKEY- Armenia: Mt.Sarutchitchak,Montb.2240 .Prov.Elazig: Harput between Hamedi & Kekan,20-5-1889,Sint.410 ;Harput, Schuschnas,8-6-1889,Sint.674.Prov.Malatya/ Kayseri: E.side of pass between Pinarbasi & Gurun,1800m.,18-6-1954,Davis 21960.

c. var. sisianica (Boiss. et Buhse) Rohrb.,Monogr.Sil.,136(1868).

Syn. S.sisianica Boiss & Buhse, Aufz.,36 (1860).

Plants branched from the middle upwards;branches ascending,hirsute and puberulent throughout.Leaves straight. Cymules 3-5-flowered,more or less congested.Calyx with less prominent nerves,nerves papillose;teeth oblong,obtuse.Capsule 3-4 times as long as anthophore.

Type- Ad Sisian prov.Transcaucasicae Karabagh,Buhse .

IRAN- Mt.Avroman,2100-3000m.,Hausskn.

Geogr.(of sp.) Turkey,Iran & Caucasus.

Habitat-(of sp.)-Alpine-rocky slopes of mountains;alt.-1600-3000m..Fl.-June-Aug.

S.arguta bears a certain resemblance to S.Montbretiana Boiss. so far as the general habit,branched & suffruticose caudex,& inflorescence are concerned,but is set off from the latter by its usually subfalcate leaves that are strongly 3-nerved,cylindrical calyx which in fruit becomes clavate and adpressed with the nerves becoming strongly elevated,and petal limb obcordate with cuneate base.It is further distinguished by the relative length of capsule & anthophore.S.arguta also shows some affinities with S.oreophila .

54. S.oreophila Boiss.,Fl.Or.,i,617 (1867).

Perennial,15.0-28.0 cm.tall.Caudex slender,3.0-15.0 cm.long,2.0-4.3mm.wide,erect or ascending,branched,bearing bases of old leaves.Stem erect,sometimes arcuate at the base,simple terete,usually purplish from the base upwards,greyish with short crisp hairs,glandular above especially in the region of inflorescence.Caudical & lower cauline leaves rosulate,petiolate.

2.3-7.9 cm.long,2.0-9.0 mm.wide,oblong- to linear-lanceolate, attenuated into petiole,base with hyaline ciliate margin,acute or nearly so;middle cauline leaves sessile,1.6-4.5 cm.long,2.0-6.5 mm.wide,lanceolate to linear-lanceolate,acuminate;upper cauline leaves like the middle cauline leaves,or sometimes ovate-lanceolate;all leaves 3-nerved at the base,puberulent. Inflorescence usually a dichasial cyme,sometimes few-flowered panicle.Bracts & bracteoles subequal,ovate acuminate or lanceolate acute,3-nerved,with hyaline ciliate margin.Pedicels of terminal flowers 2.5-4.0 mm.long,& those of lateral flowers 7.0-18.0 mm.long.Flowers hermaphrodite,erect.Calyx 2.35-2.6 cm.long, 4.5-6.0 mm.diam.,cylindrical-clavate,with 10 pinkish anastomosed nerves,umbilicate,glandular-puberulent & viscid,in fruit clavate with base narrowed below the capsule;teeth 3.0-3.5 X 2.8-3.0 mm., oblong-ovate,obtuse,with hyaline scarious margin.Petal white, 1.65-2.15 cm.long;claw 1.0-1.2 cm.long,equaling or slightly exceeding calyx,smooth;auricles obtuse,round often obscure;limb 6.5-9.5 X 5.5-7.3 mm.,oblong-cuneate,bipartite to the middle into oblong-spathulate lobes;ligules two,1.0-1.5 mm.long,oblong, obtuse or denticulate.Filaments exserted,smooth.Styles 3, included,hairy.Anthophore 9.0-11.0 mm.long,sparingly hairy. Capsule 10.0-12.0 X 4.0-5.3 mm., oblong-conical,as long as or somewhat longer than anthophore,included.Seed brow,1.0-1.3 mm.long,with flat tuberculate face & grooved granulate back.Ch.

a.var. oreophila . Rohrb.,Monogr.Sil.,136 (1868).

Leaves 1.6- 3.7 cm.long,2.0-3.5 mm.wide, linear-lanceolate or linear,subobtuse,prominently 3-nerved,shortly

attenuated into petiole.

Type- In monte Alidagh Cappadociae,Bal. [holo.G.;iso.K'.]

TURKEY-Prov.Sivas:Yildiz dag,2400m.,7-6-1890,Bornm.1660.
Anatolia,Ananias dag,May-June,1898,Whittall.

b. var. latifolia Chowdhuri,var.nov.

A typo foliis majoribus (4.3-7.9 cm.longis,4.0-9.0 mm.latis) oblongo-lanceolatis,in petiolum longe attenuatis, acutis.differt.

Type.
TURKEY- Iraq -Penjwin,1000m.,23-4-1947,Rawi 8810 [holo. K.]

Geogr.(of sp.) Turkey & Iraq.

Habitat (of sp.)- On mountains ;alt.-1000-2400m..Fl.-May & June.

S.oreophila is close to S.arguta ,but differs in its reduced inflorescence,large flowers,and relative length of capsule & anthophore.It also resembles S.Montbretiana in general habit,and inflorescence,but is distinguished by its 3-nerved leaves,wide calyx,the shape of the capsule,& form of the petal lamina .

SECTION 16 ODONTOPETALAE

The species of this section are characterized by stout, woody, branched caudex, low stature, lanceolate, oblanceolate, ovate or ovate-lanceolate, sometimes linear-lanceolate leaves, subscapiform or leafy stems, large & conspicuous flowers. Most of the species are found in mountainous localities, but they occur in 3 or 4 distinct regions.

The species of the subsection Dentatae are widely distributed in 3 distinct areas, of which the Middle East area contains the maximum number of species; these species are rather distinct from the other two groups occurring in Europe and China. The subsection Lychnideae is restricted to Caucasus & Siberia.

Key to the subsections.

Leaves oblong-lanceolate to ovate-lanceolate; flowers erect; calyx teeth acute; lobes of lamina usually with two lateral outgrowths; claw smooth
.....16A. Subsection Dentata

Leaves narrowly lanceolate or linear-lanceolate; flowers subnodding; calyx teeth obtuse; lamina without lateral outgrowths; claw ciliate
.....16B. Subsect. Lychnideae

SUBSECTION 16A DENTATAE

55. S. odontopetala Fenzl, Pugill. Pl., 9 (1842).

Caespitose perennial, (2.0) 4.0-27.0 cm. tall. Root woody, stout, deep-seated, with a multicipital crown. Caudex woody

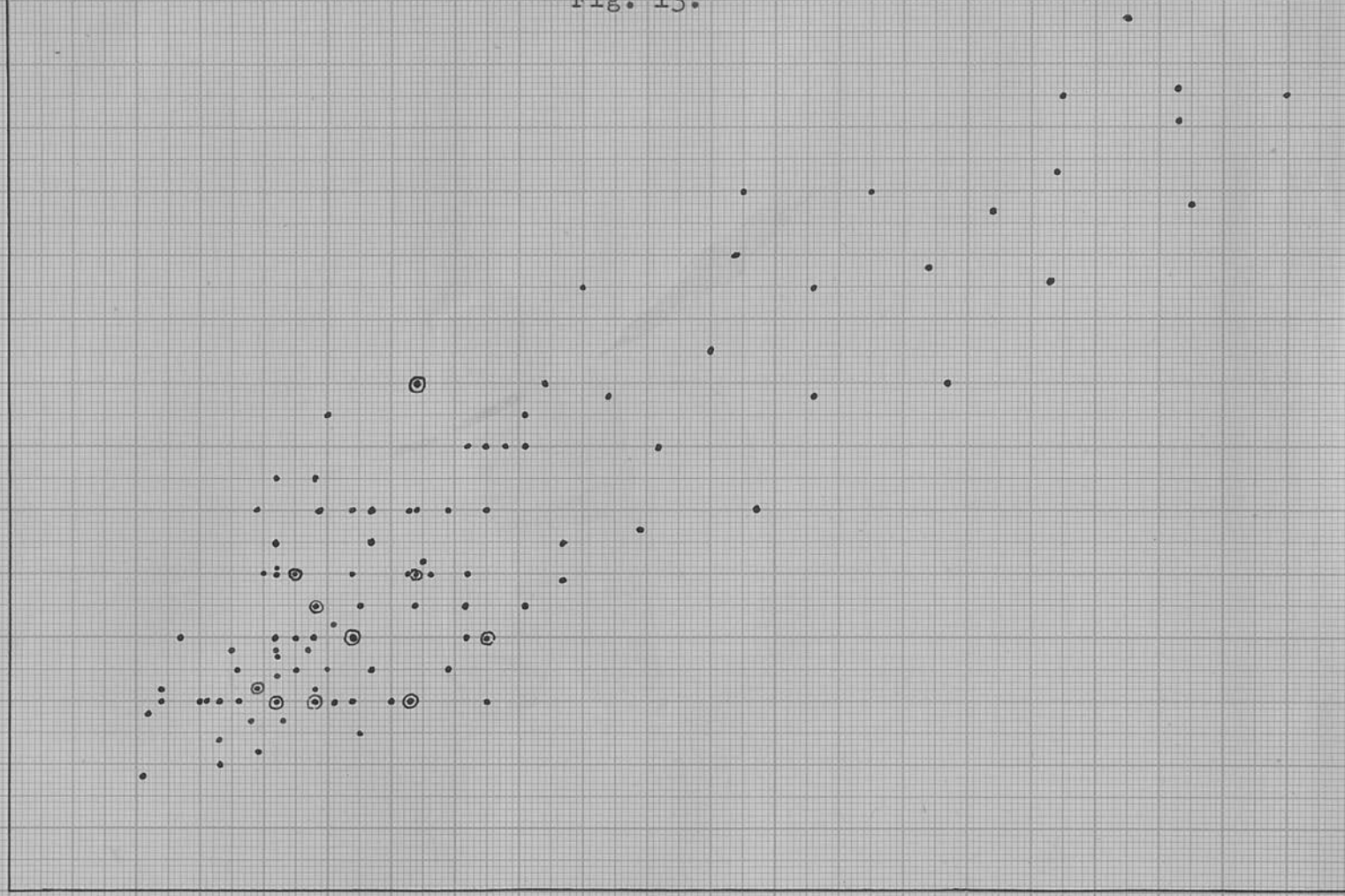
20-270 cm.long,50-140mm.wide,stout,becoming branched and suffruticose,with marcescent shreds of old petioles on the comparatively younger part and leaf scars on the older parts, erect or ascending,1-few-stemmed.Stem erect,ascending,sometimes more or less arcuate at the base,terete,subscapiform or leafy, usually simple,sometimes branched in the region of inflorescence, usually viscid above;indumentum varius-usually densely pubescent below,rarely glabrescent,becoming glandular above;hairs white, erect or spreading,sometimes crisp,eglandular and glandular occurring together,seldom hairs long,stiff and eglandular throughout;middle internodes 0.8-6.5 cm.long.Caudical leaves rosulate,petiolate,large,1.0-8.5 cm.long,2.5-180mm.wide,lanceolate, oblanceolate,linear-lanceolate,attenuated into petiole,base with hyaline ciliate margin,persistent;cauline leaves in a few pairs,sessile,more or less reduced,0.7-4.5 cm.long, 2.0-130 mm. wide,oblong,lanceolate or linear-lanceolate,sometimes ovate or ovate-lanceolate;all leaves 1-nerved,acute or acuminate,seldom obtuse,lower ones pubescent or more or less hirtellous,upper ones glandular-puberulent.Inflorescence a compound dichasial cyme,lax ,seldom congested,often flower solitary per stem. Bracts and bracteoles equal,ovate- or linear-lanceolate, acuminate,with membraneous ciliate margin,with the pedicels glandular-puberulent,less often hirsute or villose.Pedicels 4.0-25.0 mm.long,erect or ascending.Flowers hermaphrodite,rarely pistillate due to abortion of stamens.Calyx 0.9-1.8 (2.1)cm.long,4.0- 6.0mm. diam.,oblong-campanulate,membraneous,white or pinkish,with 10 anastomosed and pinkish nerves,glandular-puberulent & more or less hirsute and viscid ,base umbilicate;teeth equal or subequal,

2.5-3.5 X 3.0-6.0mm.,triangular,ovate-triangular,apiculate, acute or acuminate,with hyaline densely or sparsely ciliolate margin.Petal 1.1-1.8 cm.long,white with fine lines of crimson-red, dorsal surface with pinkish tinge;claw 8.0-14.0 mm.long,equaling or slightly shorter than calyx,smooth,expanded above,auricles obtuse,acute or round,sometimes obscure;limb 30-6.5 X 2.5-4.0 mm., ovate-oblong,sometimes cuneate,bipartite,lobes oblong with usually a lateral outgrowth on each;ligules two,1.0-2.0 mm.long,oblong or ovate,obtuse or denticulate.Filaments exserted,smooth.Styles 3, exserted,hairy.Anthophore 2.5-5.3 mm.long,stout,smooth.Capsule 7.0-9.0 X 3.0-5.0 mm.,ovate,as long as or 2-3 times as long as anthphore,included.Seed dark brown,1.0-1.5 mm.long,reniform, with flat,striate face & grooved granulate back.Chw.

This is a wide-spread and highly polymorphic species. The variation within the species is more or less continuous,but extreme variants occur.These are connected with the more common forms by intergradations.

Boissier & Williams have held that S.odontopetala has 3 varieties- var. cerastiifolia ,latifolia & congesta.Post and Bornmuller added 3 more.Thus,altogether, six varieties have been recognized.The var. cerastiifolia Boiss. differs from the common form by " folia caulina anguste lanceolata longe attenuato-acuminata,dentes calyces longiores acuminati".To evaluate the alleged leaf difference between the variety & common form,I have analysed the available herbarium material.A scatter diagram (fig.13) is given with the data obtained,in which leaf breadth of the specimens is plotted against length.The ringed points indicate

Fig. 13.



S.odontopetala var.odontopetala-•

var.cerastiifolia-•

Fig.13.Scatter diagram showing correlation of leaf length & breadth (flowering stems).

two gatherings.It will be seen that a positive correlation is shown,and that the variation is continuous.The var.cerastiifolia (marked in red) reported from Antalya (Lycia) has the leaf length/ breadth ratio within the range of the common form and cannot be maintained.

The length & breadth ratio was again divided into 4 groups and these were plotted in the map (map 4).From the map it is clear that these groups do not occupy any distinct areas.

Fig. 14 represents a scatter diagram where the breadth of calyx teeth is plotted against length.The ringed points indicate two gatherings.Here also it will be seen that a positive correlation is shown,and that the variation is continuous.In this character also the populations can not be separated into subspecific categories.Lastly I have tried the size and presence or absence of lateral outgrowths of the lamina.The populations with or without such outgrowths were plotted in the map (map 5) .Their distribution shows that there is no correlation between the character & the geographical distribution.The variation inthe shape and size of calyx teeth as well as that of lateral outgrowths on the lamina are shown in fig. 12.

The "var. rubella Post" with reddish calyx,does not occur in Lebanon only,but is scattered here & there throughout Turkey.So is the case with the "var. viscosa Bornm.."I have not been able to examine any specimen of the var.perlata Bornm..

The var. congesta Boiss. (var.sinaica (Boiss.)Rohrb.) from Sinai is a distinct variety with the sessile flowers crowded at the apices of the stems.

Five forms,of which one is new, occupy more or less

Fig.12

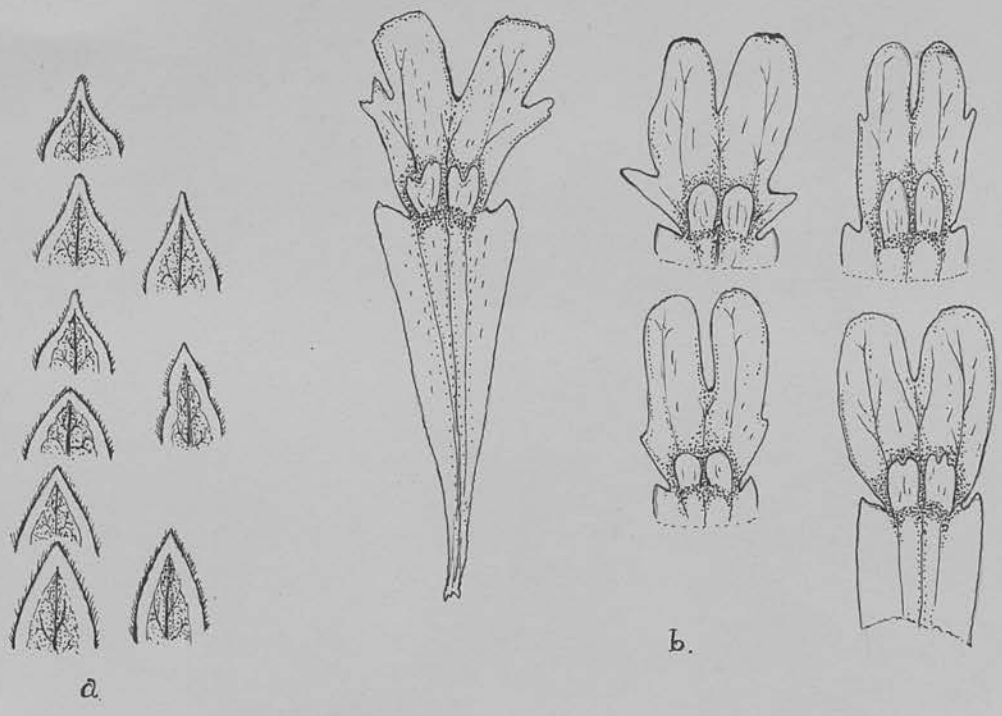
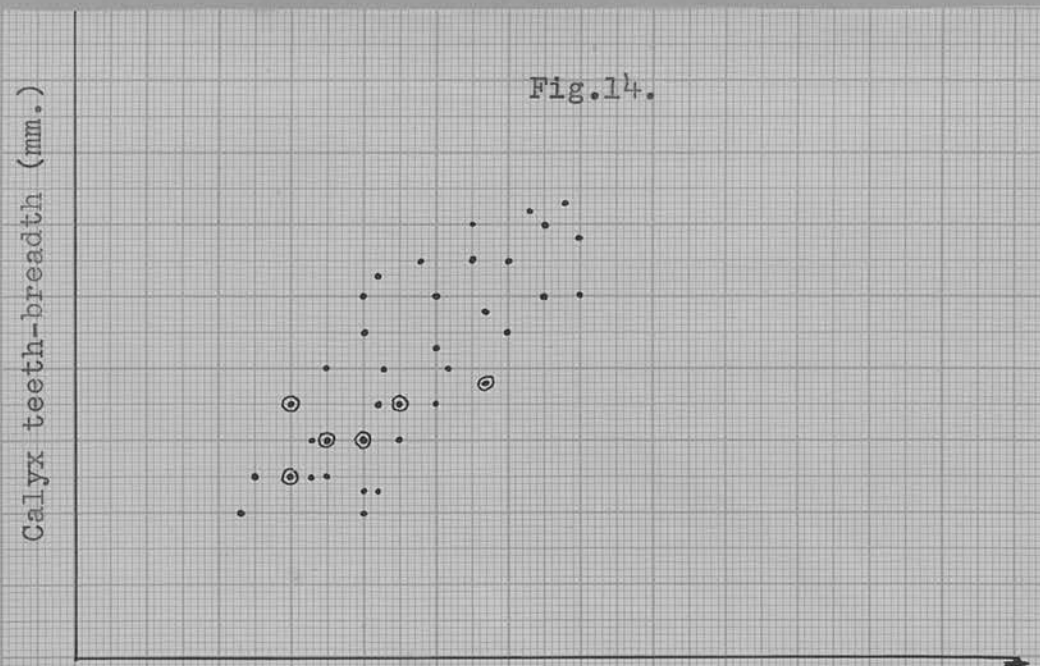


Fig.12.Silene odontopetala: different shape of calyx teeth and lamina of petal.

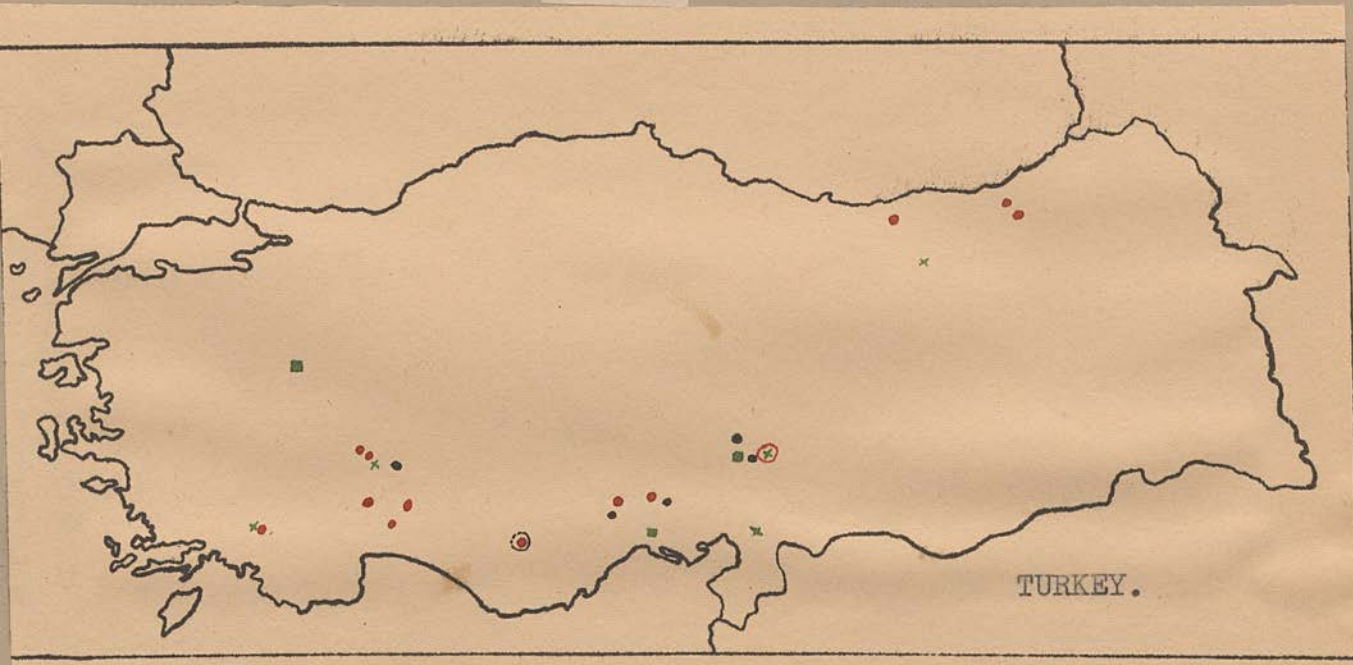
Fig.14.



Scale - 1 cm.= 1 mm.

Fig.14.Scatter diagram showing correlation of (calyx)teeth length breadth of S.odontopetala.

MAP 4



Map 4.Distribution of S.odontopetala(on leaf length/breadth ratio)

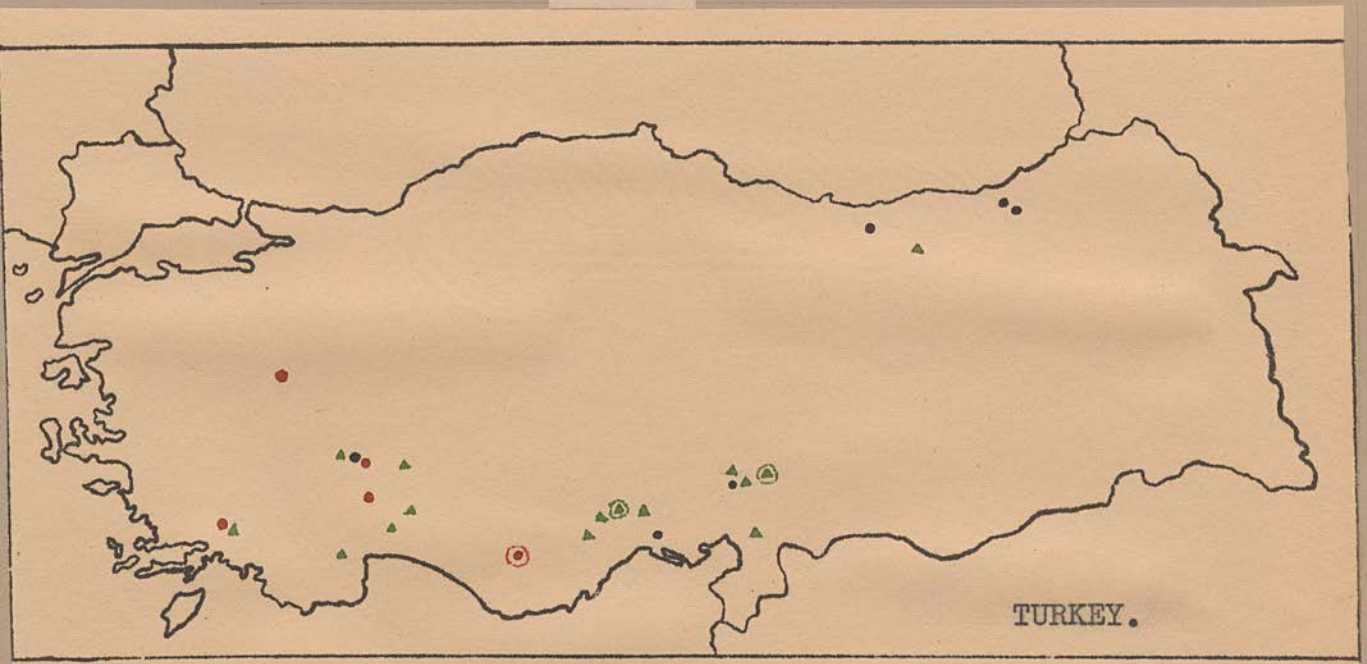
Key:- Length/ breadth ratio of the leaf from 2·4 to 3·5 - •

Do do do do do 3·6 to 5·0 - •

Do do do do do 5·1 to 7·0 - ×

Do do do do do 7·1 to 8·1 - ▪

MAP 5



p 5.Distribution of S.odontopetala on the presence or absence of outgrowths from the lamina.

Key:- Strong teeth on the blade - ▲

Minute teeth " " " - ●

No teeth " " " - •

well marked geographical areas;and have been accepted as varieties worthy of taxonomic recognition.

Key to the varieties.

1a. Caudical leaves lanceolate,acute;cauline leaves lanceolate or linear-lanceolate,acute or acuminate:

2a. Flowers 1-many in a lax dichasial cyme,pedicellate:

3a. Plants pubescent, or more or less hirtellous,usually glandular above :

4a Plants pubescent or hirtellous,glandular-puberulent and viscid above;flowers few or solitary .....a.var. odontopetala

4b. Plants pubescent or more or less hirsute,neither viscid nor glandular;flowers many,more or less congested .....b.var.canescens

3b. Plants glabrous & more or less glaucescent,rarely sparingly puberulent above .....c.var.glabrifolia

2b. Flowers few,sessile,in a capitate cyme .....d.var. congesta

1b. Caudical leaves oblanceolate,obtuse or mucronate;cauline leaves ovate or oblong-ovate,obtuse or mearly so .....e.var. latifolia

a. var. odontopetala . Boiss.,Fl.Or.,i,625 (1867);Rohrb.,Monogr.Sil., 78 (1868);Post,Fl.Syr.Pal.& Sinai,i,183 (1932) Bouloumoy,Fl.Lib. Syr.,t.5.no.1 (1930);De Vries, Mutationst.,ii,222 (1903).

Syn. S.cerastiifolia Boiss in Bourg.Pl.Exs 1860 ms.

S.odontopetala var.cerastiifolia Boiss.,Fl.Or.,i,626(1867).

S.odontopetala var.genuina Rohrb.,Monogr.Sil,78 (1868).

S.odontopetala var.rubella Post,Fl.Syr.Pal.& Sinai,i,184 (1932).

S.odontopetala var.viscosa Bornm. in Zur.Fl.Lib.,192(1914).

S.odontopetala var.montana Fenzl in Ky.,It.Cilic.Taur. (1853)ms.

Plants densely pubescent,often hirtellous,becoming glandular & viscid above.Stem leafy.Leaves oblong- to linear-lanceolate, acute or acuminate.Flowers few in a lax dichasial cyme,or solitary. Calyx white or pinkish,1.4-1.8 (2.1) cm.long.

Type- Turkey-in alpibus Tauri occidentalis Ky.82 [holo.G.?; iso.K'.]

TURKEY. Selected specimens: (leave ½ page)

TURKEY- Prov.Mugla:Girdev dag(Eren dag),2300m.,6-8-1947,Davis 13974;ibid.2200m.,3-8-1947,Davis 13773

Prov.Antalya:Calbali dag,2000-2100m.,14-7-1949,Davis 15288;Fesliken yayla,Karcukum nr.Calbali dag,1800m.,14-7-1949, Davis 15405; dt.Gebiz (Pisidia),Bozburun dag between Bogaz Azzi & Tozlu Cukur yayla,1600m.,24-7-1949,Davis 15512;Bozburun dag, above Tozlu Cukur yayla,1900-2100m.,25-7-1949,Davis 15619.

Prov. Isparta:Geyik dag,2400m.,31-8-1947,Davis14511; Ak dag (S.of Geyik dag),2300m.,28-81947,Davis14388;Dedigol dag at Oruzgaz yayla,1700m.,1-8-1949,Davis 15941;dt. Sutcular, Dedigol dag,above Oruzgaz yayla,2-8-1949,Davis 15978.

Prov.Kutahya;dt.Gediz,Saphane dag,2000m.,27-8-1950,Davis18453.

Prov.Konya:Sultan dag,above Yasin,1850m.,1-7-1899,Bornm. 4178; above Ermenek,July 1845,Heldr..

Cilician Taurus: Bolkar daglari,Castelle Gullek,1500m., July1853,Ky.162.215; Bulkar magera at Felsen,a1896,Siehe 537 ; Maaden Tepessi,1800-2100m.,Ky..

Prov.Mersin:dt.Anamur,nro Camurlu yayla,between Ermenek & Anamur,15-8-1949,Davis 16262 ;Gulnar,6-9-1950,Atilla.

Prov.Seyhan:dt.Saimbeyli,Bozoglan dag,above Obruk yayla, 7-7-1952,Davis 19735; Bahce (Amanus),Dildil dag,between Baskonus yayla & Hussein Obruk Cesmesi,27-8-1949,Davis16404;dt.Karaisah, Bolkar daglari,between Meydan yayla & Saristepe yayla,2-9-1949, Davis 16559.

Prov.Maras:dt.Goksun,Binboga dag,1500m.,14-7-1952,Davis 19946;dt.Cardak,Kandil dag,1900m.,24-7-1952,Davis 20234; dt. Cardak, Berit dag,2800m.,26-7-1952,Davis 20343 ;ibid. 2400m., July1867,Hausskn.;ibid.2700m.,10-8-1865,Hausskn.

Prov. Rize: from Garsova to Rize,Gul yayla,2700m.,30-7-1934, Balls 1910;dt.Hemsin,Ortakoy Cat.2000m.,2-91952,Davis 21183 ; dt.Ikizdere,Vercinin Tepe,3400m.,29-8-1952,Davis 21144

Prov.Gumusane: Karagvall dag,3-8-1894,Sint.7291;Kardomer, 9-7-1894,Sint.6231;between Bayburt & Trabzon,June1834,Montb.2588

Lazistan,sine loco ,Aucher 490

Prov.Erzincan:Kesis dag,Aucher 428

Prov.Hakkari:Cilo dag,10km.W.of Cilo tepe,3600m.,9-8-1954, Davis 24184 ;Cilo tepe,3150m.,8-81954,Davis 24072.

Prov.Bitlis:dt.Kotum,Karz dag above Kamere,2200m.,24-8-1954, Davis 24594;Kambos dag,1800m.,31-6-1954,Davis 23490.

SYRIA- Mt.Hermon,12-7-1890,Post;Dahr-Abu-ul-Hin,15-7-1890 Post; sine loco. al846,Pinard .

LEBANON- Beirut,Mt.Sanin,1950m.,11-7-1952,Mooney 4529;Makmel, July 1846,Boiss.;sine loco Aucher 446.

IRAQ- Kurdistan-Gara dag,1700m.,26-6-1947,Rawi 9286;ibid.,1900m., 26-6-1947,Rawi 9273;Musul,al841,Ky.600.

IRAN- Kurdistan,Satri Sakran,2200m.,23-6-1893,Bornm.982;Djulfeck, Aucher 4227.

b. var. canescens Chowdhuri,var.nov.

Caules 12.0-25.0 cm.alti,foliosi,simplices vel sparse ramosi,ut folia canescentes,hirtello- vel tomentoso-pubescentes, haud viscidi.Folia caudicalia 2.7-5.9 cm.longa,4.0-7.0 mm.lata, oblanceolata vel lanceolata;caulina oblongo- vel linearilanceolata.Inflorescentia plus minus congesta.Flores breviter pedicellati.Calyx 1.2--1.5 cm.longus,campanulatus,albidus,hirsutus vel tomentosus,haud viscosus.Capsula 5.0-7.0 mm.longa,anthophoro duplo longior.

Type- Syria--Anti-Lebanon,West of Ein in Sur (above Bludan) shady vertical rocks,2100m.,7-8-1945,Davis9879 [holo.K.;iso.E.]

SYRIA -Yebrud,1440m.,10-8-1945,Davis 9904.

e. var. latifolia Boiss.,Fl.Or.,i,626 (1867).

Syn. S.physocalyx Ledeb.,Fl.Ross.,i,321 (1842).

S.odontopetala var. physocalyx (Ledeb.)Rohrb.,Monogr. Sil.,79 (1868).

Caudical leaves oblanceolate,obtuse or mucronate,rarely acute;cauline leaves ovate or oblong-ovate,obtuse or nearly so. Flowers solitary,or few in a lax dichasial cyme.Calyx glandular-puberulent & viscid.Plant finely and minutely puberulent,becoming sparsely glandular above.

Type- In provinciis Caucasicis occidentalibus, Nordmann.

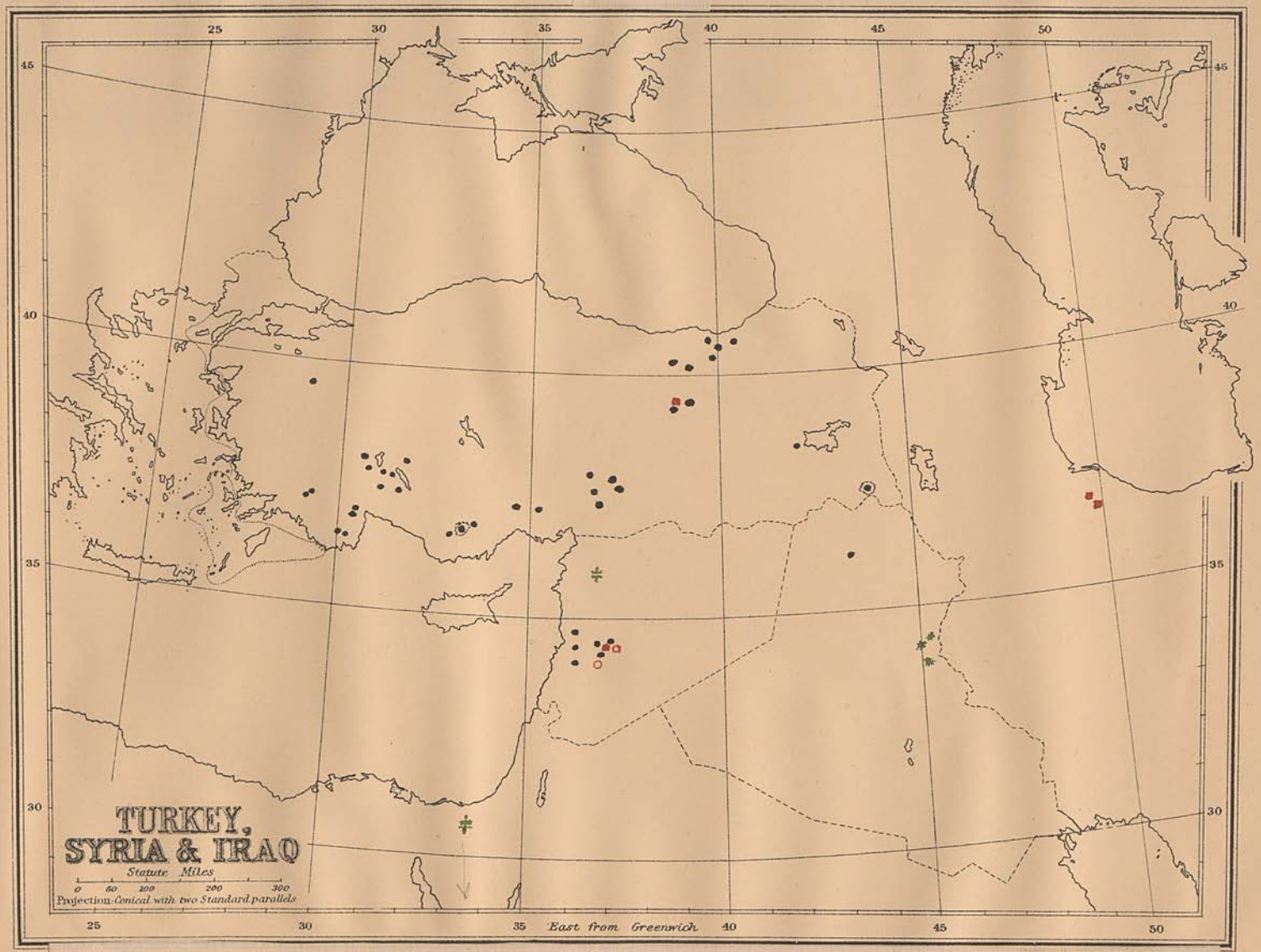
TURKEY- Prov.Erzincan:Kemaliye (Egin),Kyl Maghara dag,5-7-1890, Sint.2896.

SYRIA- Mt.Hermon,26-8-1899,Post.

IRAN- Mt.Elbrus ,nr.Passgala,10-6-1843,Ky.295;Gerdene Bary,Asadbar, 2700m.,1-7-1902,Bornm.6386.

This variety shows a peculiar geographical distribution, being isolated in several distinct areas in the Orient.In the past its distribution may have been more continuous than it is now;on the other hand,it may be that var. latifolia is of polytopic origin. The distribution of these varieties have been shown in map [Map 6].

MAP 6



Map 6.Distribution of Silene odontopetala

Var.odontopetala ● Var.latifolia ■ Var.glabrifolia ✱

Var.canescens ○ Var.congesta ≑

SECTION 17 CORDIFOLIAE

The 5 species of this section are characterized by short stout caudex ,leafy stem,ovate or ovate-lanceolate leaves with cordate base,calyx oblong-cylindrical or oblong-clavate and more or less inflated.Petal (except S.lazica Boiss.) bipartite and ligulate.In S.lazica the petal is quadripartite, and for this reason S.lazica shows some similarity to S.odontopetala Fenzl .

In the character of the caudex,inflorescence and inflated calyx this section comes near Section Odontopetalae ,but it differs from the species of the latter section by the leafy stem, leaf shape and shape of calyx.

Out of 5 species,only one species is represented in the Orient.

56. S.lazica Boiss.,Diagn.Pl.Nov.Or.,Ser.1.i,35 (1842);Boiss.,Fl.Or.,i, 624 (1867);Rohrb.,Monogr.Sil.,142 (1868).

Perennial,11.5-28.0 cm.tall,with suffruticose base. Caudex short,stout,woody,erect or ascending,simple or 2-3-branched, covered with the bases of old leaves and those of flowering shoots, each branch of the caudex many-stemmed.Stem erect or geniculately erect,terete,simple or sparingly branched,leafy,coarsely puberulent and hirsute throughout,becoming glandular and viscid above;middle internodes 2.0-3.7 cm.long.Caudical leaves rosulate.petiolate,1.6-2.3 cm.long, 6.0-13.0 mm.wide,oblong- or ovate-lanceolate,shortly attenuated into petiole,base with hyaline ciliate margin,persistent; cauline leaves sessile,conspicuous,gradually reduced above,2.6-3.6

cm.long,2.3-3.2 cm.wide,lower few pairs like the caudical leaves, middle and upper ones ovate-cordate;all leaves acute to acuminate, puberulent and hirtellous,obscurely 3-5--nerved.Inflorescence a dichasial cyme,3-12-flowered.Bracts equal,ovate&acuminate or lanceolate acute,including pedicels pubescent and hirsute.Pedicels 6.0-13.0 mm.long,erect or ascending.Flowers hermaphrodite,erect, lateral ones with long pedicels.Calyx 2.3-2.8 cm.long,5.0-6.0 mm. diam.,oblong-cylindrical,membraneous,more or less inflated,truncate, with 10 anastomosed often pinkish nerves,hirsute,sparingly puberulent and viscid,in fruit oblong-clavate;teeth 4.0-4.7 X 2.0-2.8 mm., lanceolate or ovate with constricted base,acute,with wide membraneous ciliate margin.Petal white,2.4-2.73 cm.long;claw 1.8-2.0 cm.long, exceeding calyx tube,smooth;auricles obtuse,round or true auricles lacking;limb 6.0-7.3 X 5.0-7.0 mm.,cuneate,quadripartite,lobes unequal,linear or oblong-linear;ligules two,1.3-2.3 mm.long,oblong, obtuse or emarginate.Filaments included,smooth .Styles 3,hairy, included.Anthophore 7.0-8.5 mm.long,smooth.Capsule 10.0-13.0 X 4.5-5.5 mm.,oblong,1½-2 times as long as anthophore,included.Seed dark brown, triangularly or quadrangularly reniform,with flat or more or less concave and convex back,papillose.Chw.

Type-Turkey-in alpibus Lazistani Aucher 494 [holo.G.;iso.K'.,BM'.]

TURKEY- Prov.Gumusane/Trabzon:Mts. nr.Bayburt,Montb.2587 .Prov. Gumusane : Argyri dag,20-6-1894,Sint.5941 ;Gumusane,14-6-1894 Sint.5872 . Armenia, Tach Kopru,Aug.1853,Huet .

Geogr. Endemic ,

Habitat-Rocky place at high altitudes.Fl.-June ,